University of Southampton

Faculty of Arts and Humanities

Modern Languages

Directionality in Chinese-English Translation: An Investigation of Cognitive Efforts and Decision-making Focussing on the Translation of Allusions

by

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Thesis for the degree of Doctor of Philosophy

Sep 2021

University of Southampton

Abstract

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An allusion is an intertextual device, taking either implicit or explicit form, requiring shared cultural knowledge between the author and reader to convey the intended meaning. On the Translation Studies as a culture-oriented subject, however, research into the translation of allusion is very limited, especially in the field of cognitive processing. Meanwhile, in response to the rapid development of L2 translations in the translation industry, directionality has been introduced to look at its impact on the translation process of allusion. It is particularly worth investigating whether and how translators perform differently to the translation of allusion in two directions.

This study focused on the cognitive processing and decision-making in the translation of allusion in both directions between English and Chinese. It adopted a process-oriented approach to examine the translation of allusion through triangulation: the Think Aloud Protocol (TAP), Key-logging and Eye-tracking, to investigate the allocation of cognitive efforts and appropriate translating strategies used by translators. Two research questions will be answered: 1) What are the impacts of directionality and allusion on the translator's allocation of cognitive efforts? 2) What can be observed from the strategies used to translate the allusions in two directions?

A three-phase experiment was designed: A pre-test questionnaire (for 122 participants), a translation test (for 36 participants) recorded by eye-tracking and key-logging devices and a post-test cue-based retrospective interview, respectively. The thesis also touched upon the quality assessment of the translation of allusions for triangulation. The findings revealed that both directionality and allusion affected the allocation of cognitive effort in the translation process. Factors that influence the allocation of cognitive effort have also been identified. The results confirmed differences in translation strategies to deal with allusions because of directionality and investigated the potential factors that motivated the student translators' decision-making process.

This research is the first to combine eye-tracking, key-logging, and cue-based interviews to examine the translation process of allusions and allusive sentences between Chinese and English. It provides a fresh perspective to look at the translation of allusions and specified factors that affect the translation process. It has implications for translation research, pedagogy, and practice, offering theoretical and empirical evidence to the relevant areas and suggesting avenues for future research.

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Declaration of Authorship

Print name: HAIMENG REN

Title of thesis:

Directionality in Chinese-English Translation: An Investigation of Cognitive Efforts and Decision-making Focussing on the Translation of Allusions

I declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

I confirm that:

This work was done wholly or mainly while in candidature for a research degree at this University;

Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;

Where I have consulted the published work of others, this is always clearly attributed;

Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;

I have acknowledged all main sources of help;

Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;

None of this work has been published before submission.

Signature: .....

Date: .....

Acknowledgement

I would like to express my sincere gratitude to my supervisor Dr Ian McCall for all his time, patience, support, and encouragement throughout my doctoral programme. I sincerely appreciate his responsible supervision and constructive suggestions to shape the thesis. His profound knowledge in translation studies and extensive experience in translation practice offers me tremendous support, which makes me grow into a young researcher.

My gratitude also goes to Dr Rugang Lu, my second supervisor, for his advice on the research design in the early stage; Dr James Minney, for his invaluable feedback in every progression review to improve the thesis, and other respectable academic members and staff in the University of Southampton for their enlightening lectures and workshops to broaden my academic horizon.

I would like to extend my gratitude to Dr XiaoDong Zhang, who offered me constant support during the data collection process. Special thanks go to all the participants in my research for their time and support in pilot and formal experiments. This thesis could not have been completed without their help. In addition, I would like to pay my gratitude and respect to the late Professor Zhenhai Qi for his insightful advice on my eye-tracking design and the warm encouragement on developing my research into the cognitive-related area.

I would like to thank my friends back in China. Distance does not matter in our friendship. The thanks go especially to Dongxue Yuan, who has always been a supportive “listener” to share my ups and downs, retrieving me from stressful or depressed moods; Siyuan Ma, a passionate “orator”, motivated me to overcome procrastination and pessimism. Thanks also go to my friends met in the UK, especially Kefan Yang, Nattida Pattaraworathum, Yuren Li and Yaxin Li, for their caring and friendship throughout five years.

Lastly and most importantly, I am much indebted to my parents, Wei Ren and Guoying Ren. They have offered me unconditionally love and supported me to overcome difficulties with strong belief and inspiration, encouraging me to explore new opportunities in life. Words cannot express my gratitude to them. Without them, I would never have had the strength and confidence to start my academic career in the UK and complete the PhD; this PhD thesis is dedicated to my parents.

List of Acronyms

L1: First language translation, translation from the foreign language to the first language of the translators

L2: Second language translation, translation from the first language to the second language of the translators

ST: Source text

TT: Target text

ER: External resources

SC: Source culture

TC: Target culture

CR: Cultural references

PN: Proper name allusion

KP: Key-phrase allusion

AOI: Area of Interest

CE: Cognitive effort

RQ: Research question

GLM: Generalised linear model

GLMM: Generalised linear mixed-effect model

SPSS: Statistical Package for the Social Sciences

Chapter 1 Introduction

1.1 Research Background and Rationale

Translation is not merely the transfer of linguistic symbols but also the transfer of cultural meanings behind the language. Snell-Hornby (1988) sees Translation Studies as a culturally oriented subject. Similarly, Nida (2001) viewed language as culture and pointed out that biculturalism is more critical than bilingualism. The increasing globalisation of our world demands that communication across cultures proceeds as smoothly as possible, without too many bumps or breakdowns. However, intercultural translation problems to overcome cultural differences "can be more problematic for translators than semantic or syntactic difficulties "(Leppihalme, 1997, p. 2). Especially in literary translation, translators mediate cultural differences, convey the extensive cultural background, and deal with literary devices or cultural references, like puns, metaphors, and allusions. Translation of those cultural references involve indirect or implicit messages, investigating how the meaning of the source text can be made accessible to target language receivers. It emphasises how effectively translation functions in the receiving language culture rather than just translating the literal meaning (Leppihalme, 1997).

My research interest in the translation of culture-specific references began with my Bachelor's degree dissertation. I conducted the comparative analysis of two translations of the Analects of Confusions, looking at the translation of Chinese culturally-specific words into English. Developing my studies into a PhD, I aimed to go further into the translation of these kinds of cultural references and to find out how the translators deal with the cultural gap between the SC and TC, as well as how they transfer the meaning to the target readers in a different cultural background from the ST author and ST readers. Therefore, my PhD thesis specifically focuses on the translation process of allusion in both directions between Chinese and English.

Allusion, one of the elements present in literary texts which can create intercultural gaps, is the focus of this research. The differences between Chinese and English are wide, and the two languages are diverse in form, rules, and, most importantly, cultures. When an allusion in a text is translated, it is likely to become a challenge since it simultaneously activates two texts: it has an intended meaning about the culture and language in the source text but has not necessarily an equivalence in the target one. An increasing number of non-Chinese readers interested in Chinese history and fascinated by the culture of the Chinese people may find "cultural bumps"(Leppihalme, 1997) occur when reading translated Chinese literature, as the SC allusions are not fully translated or remain unclear and

puzzling to them. Dealing with allusions properly and making readers comprehend and enjoy the original intended meaning simultaneously would be the goal of most translators. In translation, allusions are treated as literary devices and translation problems that require appropriate strategies. Translators should play the role of mediators to translate the literal meaning and cultural connotations within the allusions. Unfortunately, studies on the translation of allusion are limited and relevant research is scarcely found between Chinese and English sources. The most extensive research on the translation of allusion is Leppihalme's (1997), which summarises detailed classification on types of allusions and corresponding strategies to deal with them. The following researchers (Bahrami, 2012; Roukonen, 2010; Salo-oja, 2004; Tringham, 2014) confirmed and developed the framework; however, the translation of allusion between Chinese and English was seldom touched upon.

Besides the cultural connotations embedded within allusions, the intertextuality and implicitness of allusions also pose a challenging problem for translators. Sometimes in implicit form, allusion can hardly be recognised by outsiders[1] with different cultural backgrounds, especially for the student translators who are less competent and experienced in translation practice. Hence, questions arise: to what extent does the identification and comprehension of allusion become challenging to student translators? Are they equipped to deal with allusions from their translation training? Roukonen (2010) investigated cultural familiarity and its relationship to the translation of allusion; however, the research focused on experienced translators. Most of the previous studies about allusions were analyses of published translations of literary work; little attention has been paid to pre-service translators and how they process the allusion. Therefore, a gap has shown itself in this area, and this thesis aims to fill it.

Researchers are usually researching in the field of translation on L1 translation. However, the translators in L1 translation often come from a different cultural background to the authors and the ST readers. It would lead to another issue that this thesis is concerned with directionality when the translators tend to be the outsiders in L1 translation and insiders in L2 translation. The translation process of allusion in L2 translation is also worth investigating since the research on the L2 translation is disproportionate to the translation practice. Although L2 translation is widely undertaken in the Chinese translation market, the theory of directionality of translation has received insufficient attention in the academic field within the Chinese context, forming a gap in the research field to be

[1] The concept of "outsiders" is understood as those who are not members of a cultural community or non-natives of the culture, in contrast to "insider" or native of the culture.

investigated. However, compared to the L1 translation, translators doing L2 translation have the advantage in understanding the ST in their L1. Similarly, they might recognise and understand allusions more easily in L2 translation, and this research endeavours to see if this can be confirmed. Therefore, it will be interesting to see how the translators deal with allusion in the L2 direction and whether there will be differences between them. The rationale of exploring L2 translation is to raise awareness of the significance of L2 translation in discussing cultural references like allusions.

This thesis adopts a more process-oriented approach to examine the translation of allusion among student translators. With the development of technology, more research methods to explore the translation process have been introduced into this field, ranging from the note-taking observation in early stages, the Think Aloud Protocol (TAP) reflecting the decision-making of participants, key-logging research which analyses the pause, to the most recent eye-tracking experiment. However, very few methods have been applied to study the translation of allusion. As mentioned before, most previous studies adopted a product-oriented view to investigate the translation of allusion, leaving a gap in the area of process investigating on this issue. Therefore, this thesis looks at the strategies used to translate allusion and analyses the translation products, also explores the cognitive processing and the decision-making of the translators when dealing with allusions in both directions. It will introduce the concept of cognitive effort (CE) as the measurement for cognitive load in the translation process and examine the allocation of CE across directions and between allusion and non-allusions. Applying key-logging and eye-tracking technology in this thesis, the pause and eye-data of the translators, have been seen as the indicator of cognitive efforts. Instead of solely analysing the TT, the retrospective cue-based TAP will reveal the translators' decision-making during the translation process, hoping to shed some light on the workings in the translators' minds. The research distinguishes itself from previous studies in that it is the first, according to my knowledge, to focus on the cognitive processing and decision-making in the translation of allusion in both directions between English and Chinese.

1.2 Research Questions and Methods

Having Chinese L1 translators as the main focus, both Postgraduates and Undergraduates in English Translation Majors, this research attempts to look into cognitive processing when translating allusions in different directions (English to Chinese and Chinese to English) from their translation performances and their reflective recall in decision-making about their strategies to translate allusions.

The first aim focuses on the cognitive efforts in the processes of Chinese junior (undergraduates) and advanced (postgraduates) student translators translating from and into Chinese and dealing with key-phrase (KP) allusions and proper name (PN) allusions, respectively. This aim is articulated in Research Question1, which is broken down into three sub-questions:

RQ1 What are the impacts of allusion and directionality on the translator's allocation of their cognitive efforts?

a) Would there be any difference in allocating cognitive efforts when translating from and into Chinese, according to eye-tracking data and typing pause analysis?

b) Would there be any differences in the allocation of cognitive efforts between translating allusion and non-allusive words or phrases, according to eye-tracking data and typing pause analysis?

c) To what extent can the Directionality, Skopos, Allusion type, length and familiarity be related to the allocation of cognitive efforts in two directions of translation?

Eye-tracking and key-logging technology will be applied for data collection to answer RQ1. RQ1a compares the cognitive effort of participants between different translation directions and how they allocate their cognitive efforts in the source area, target area and external resources area in each direction. Most importantly, whether one direction requires more cognitive effort than the other. Researchers have proved eye-tracking (e.g. Chang, 2009; Ferreira, Schwieter, Gottardo, & Jones, 2016; Wang, 2017) in the translation field as being able to explore the effects of directionality through measuring the indicators of cognitive effort, fixation duration and fixation count. On the other hand, key-logging would generate pause, which is seen as an indicator of cognitive efforts in post-editing. In terms of human translation, only a few researchers (Buchweitz & Alves, 2006; Ferreira et al., 2016; Malkiel, 2004) have discussed cognitive effort within directionality. More information about the eye-tracking technique and pupil data collection and analysis will be reviewed in Chapter 3. Using eye-tracking and key-logging techniques to compare the pupil gaze data and the pause data representing the cognitive effort allocated on allusion and non-allusive segments is expected to answer RQ1b. Data collected from eye-tracking and key-logging will be inputted into SPSS for quantitative data analysis. In responding to RQ1c, the statistical analysis model GLMM from SPSS will be adopted as a quantitative data analysis model to determine which factors contribute to the differentiated distribution of the allocation of cognitive effort when translating allusions. For details of the data analysis model, see Chapter 3.3.

The second research aim covers the strategies used to translate the allusion, the effect of directionality on the translators' choice of strategies, and the factors influencing their decision making. This is articulated in Research Question 2, which is broken down into two sub-questions:

RQ2 What can be observed from the strategies used to translate the allusions in two directions?

a) What are the strategies frequently used to translate the allusion in two directions, respectively, and how far do they differ according to the direction?

b) What might be the factors that influence the translators' choice of strategies?

Cue-based retrospective interviews and the analysis of the TTs are adopted to answer RQ2. The retrospective interview is one kind of Think Aloud Protocols (TAPs) method to collect data through the verbal report of participants recalling their mental activity after the translation tasks when used in translation studies. To ensure the credibility of the interview, participants in this research will be provided with video recordings of their translation process as hints to recall their memory. Strategies for the translation of allusion will be summarised from the TTs to answer RQ2a and are expected to correspond with the participating translators' retrospective review after the translation process to find out the possible influential factors behind their decision-making for RQ2b.

1.3 Significance of the study

Firstly, this thesis is pioneering in exploring the cognitive effort in the translation of allusion and allusive sentences between English and Chinese. Compared to other kinds of cultural references like metaphor, translation of allusions has not received much attention and studies concerning the translation problems in allusion are limited. Furthermore, most of these studies focus on strategies summarised from the translation product and process-oriented research about the translation of allusions is even more limited. Therefore, this thesis is expected to fill in the gaps in this area by looking at the translation process of the allusion from a cognitive perspective through the investigation of cognitive effort.

Secondly, this thesis focuses on student translators instead of professional translators, aiming to provide a fresh insight into the translation of allusion and translation training in this area. These participants, who majored in Translation Undergraduate and Postgraduate degree courses, have little or no experience in translation practice and have received only two years of translation training at university. The investigation into their performance and perceptions in translating allusions will

hopefully reflect the merit and weakness of current translation training that participants receive and, therefore, will seek to shed light on translation pedagogy.

Thirdly, the triangulation of eye-tracking, key-logging, TT analysis and retrospective interview used in this thesis has never been applied to analyse the translation of allusion before. This non-intrusive data collection method, combining objective cognitive indicators, eye-metrics and key-pause, and subjective perception, presented a comprehensive discussion about cognitive processing and decision-making. This data collection model works as a pilot for further research to investigate the translation of allusion from empirical and experimental perspectives.

Last but not least, by looking at both directions of translation, this thesis advocates the importance of L2 translation processing in translation procedures, which has not received attention in the translation field despite the need for L2 translators. The L2 translation has become a common practice in the translation industry, while the academic research on L2 translation has not caught up with the practice, and thus this has led to more gaps within the research field. This thesis will identify differences in cognitive allocation, strategies adopted, decision making between two directions in the translation of allusions. The findings on directionality are expected to be useful as references for the translation training curriculum.

1.4 Thesis structure

This thesis is composed of seven chapters. The Introduction in Chapter 1 locates this research within the Translation Studies research field, clarifies the research design and method to be used, illustrates the significance of the research and establishes the structure of the thesis.

Chapter 2 Literature Review is structured into two main parts, based on the two foci of this research: directionality and allusion. Section 2.1 will commence with the discussion on the issue of directionality in Translation Studies. In line with previous studies that compared the L1 and L2 translations(Grosman, 2000; Pokorn, 2000; Shi, 2013), this research will compare the translation process across the two translation directions and demonstrate that L2 translation should be highlighted in Translation Studies. On top of this, this research will adopt a process-oriented perspective (e.g. Chang, 2009; Ferreira et al., 2016; Wang, 2017) to compare two directions from a cognitive point of view. Section 2.2 will address the characteristic of allusion as an intertextual element and cultural reference. This section will review Leppihalme's (1997) framework categorising the allusions into different types and introducing varying translation strategies to deal with allusions.

Chapter 3 Methodology and Research Design will describe the methodological framework of this research. Section 3.1 will specify the three phases of the research design: Pre-test questionnaire, Eye-tracking translation experiment, Post-test survey and interview, followed by the criteria used to build the ST corpus and select participants. Section 3.2 outlines the procedures selected for data collection and preparation in each phase and the data analysis model, along with an introduction to eye-tracking metrics, eye-data quality, AOIs, and pause threshold.

Chapter 4 Findings from the Questionnaires is the results from the Pre-test and Post-test questionnaires. Section 4.1 will explore participants' academic backgrounds, translation experience, and attitudes to directionality and translation of allusions. Those findings are expected to provide insights to complement the following eye-tracking data and data from the retrospective interviews.

Chapter 5 Cognitive Effort in the Translation process is represented by eye-tracking metrics and key-logging pause. Section 5.1 comprises two parts. The first part focuses on the cognitive efforts (CE) allocated in the translation process through the eye-tracking experiment. Comparing the CE in different AOIs in two translation directions will provide evidence on which direction is more cognitively demanding and which parts of the translation process require more CEs. Furthermore, GLMM analysis will reveal which factors significantly impact the allocation of CE in the two directions. The second part will compare the CE between allusion and non-allusion to see whether the allusion requires significantly more CE to comprehend than non-allusion. It also examines the correlation between CE allocation and related factors. Section 5.2 will look at the CE through the key-logging data: the descriptive analysis of key-related data in two translation directions and the GLMM analysis on pause length and number during the TT production to identify factors that possibly influence CE.

Chapter 6 Translation strategies for allusion in both directions is examined by both the completed TTs from the participants and the retrospective interview, based on the theoretical framework proposed by Leppihalme (1997) and the revised model (Roukonen, 2010). Furthermore, the retrospective interview will also reflect the participants' decision-making process and the potential factors which affect the choice of strategies.

Chapter 7 Conclusion will summarise the main findings and how these findings work together to answer the research questions, the strengths and limitations of this research, the implications and contributions. Section 7.1 will be a condensed reading of the thesis, and Section 7.2 will specify the research findings and discuss whether the findings have successfully answered the research questions. Sections 7.3 and 7.4 will highlight the research's strengths and limitations and the

implications and contributions to the research field. At the end of the thesis, Section 7.5 will suggest possible avenues for future studies.

Chapter 2 Literature Review

This chapter aims to locate the research in Translation Studies and define the research gap this thesis strives to fill. Thus, it is necessary to review previous research activities and developments within the following research areas: directionality of translation and translation of allusions. Figure 1 helps to illustrate the position of the research within the field.

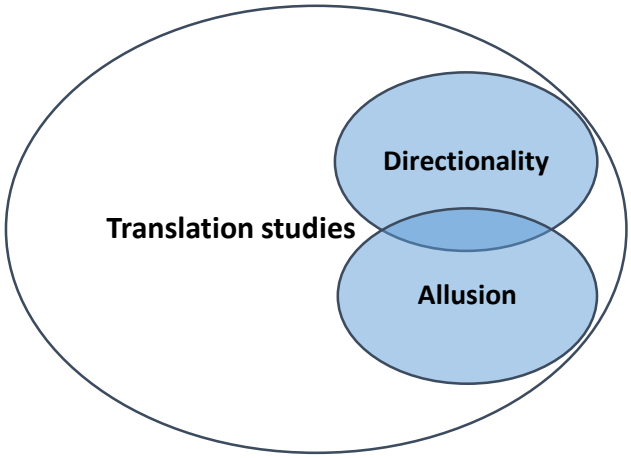

Figure 1 Locating this thesis

To better locate the present thesis and identify the gap, the structure of this chapter is organised into two main sections. Section 2.1 provides a general overview of the concept of directionality in Translation Studies and specifies the various research methods conducted to explore this topic further. It starts with a review of debates over L1 and L2 translation in the field (Section 2.1.1) from theoretical and practical perspectives. In Section 2.1.2, a theoretical consideration regarding English as Lingua Franca and its effects on the norm of directionality are presented. Previous empirical studies comparing L1 and L2 translation from different angles are reviewed in Section 2.1.3. The sub-sections highlighted the background for the empirical study of the cognitive aspects of directionality between English and Chinese translation later in the present thesis. Section 2.2 introduces the translation of allusion, the literary device with both intertextual relations and cultural information. The definition of allusion has been put forward in Section 2.2.1, beginning with Leppihalme's (1997) model, which will be the framework for analysing the translation strategies in this thesis in Section 2.2.2. Reviews of studies on the translation of allusion are presented in Section 2.2.3, in which the translation strategies for allusion and the problems encountered during the translation of allusion will be discussed.

2.1 Directionality of Translation

Globalisation in our modern world is leading to more studies on translation processing and a better understanding of the intervention of translators in both directions of translation. The directionality of translation refers to the fact that translations can be done from a foreign language into a mother tongue or vice versa (L. Beeby, 1998). Inverse Translation, or Reverse translation, stands for translation into a foreign tongue, while direct translation implies translation into the native language of the translator (Baker & Saldanha, 2009). However, the words "reverse" or "inverse" tends to lead to explicit negative meanings as "going into the wrong direction" (N. Pavlovic, 2007a, p. 3). To avoid this bias, direct and inverse translations are typically named L1 translation and L2 translation, borrowed from the second language acquisition field. One point that should be noted here is that, although the terms "direct translation" and "L1 translation" all refer to translation into the mother tongue, the terms "inverse translation" and "L2 translation" are not identical concepts as L2 translation only refers to translation into a second language, while inverse translation represents the translation process from the mother tongue into any foreign language. This thesis investigates the issue between the language pair of Chinese and English and was targeted at student translators whose second language is English; hence the terms L1 and L2 translation will be adopted for convenience.

2.1.1 The Debates: Theory and Practice

Linguistic competence is rarely the same between the two directions, and most research presupposes L1 translation as the "golden rule". In Translation Studies, many researchers took it for granted that native speakers of the target language should do translations. Previous researchers believed that native translators could render the translation with all the devices to contribute to a more natural and fluent text than second language translators; presumably, first language translators are less likely to make grammatical errors and unfortunate vocabulary choices. By contrast, second language translators are less competent in language comprehension and production. It is recognised as the shortage of L2 translators, and translation into the mother tongue is the only way to maintain naturalness and accuracy with maximum effectiveness. Newmark (1988) pointed out that L2 translation is not authentic and natural. This is also noted by other researchers who believe that unnaturalness is the main weakness of L2 translation. According to Duff (1989), the interference from the ST for the translators doing L2 translation would lead to unnaturalness in the TT, and thus only the native speaker who can grasp the power of lexical items of the TT should be responsible for the translation. Emphasising the interference error, Dollerup (2000) believed that TT from the L2

translators could never be as authentic as native translators, especially in literary translation. However, it remained questionable that, firstly, no reliable empirical data proved the interference of ST or linguistic incompetence of L2 translators, compared to the L1 translators. Secondly, Duff's idea that translators should acknowledge the power of words beyond the dictionary meaning turns out to be the proof for the significance of L2 translation: L2 translators who can better comprehend the ST and the underlining meaning beyond the text should not be neglected in the translation research.

Besides questioning the L2 translator's target language construction, researchers who prefer the L1 translation over L2 translation believed that a perfect command in the target language could make up for the lack of knowledge in the source language (cited in Zahedi, 2013). Newmark (1988) similarly emphasises that sensitivity and competence in the target language, for example, writing one's L1 "dexterously, clearly, economically and resourcefully" (1988:3), is more important to a translator than knowing a foreign language or subject since it can avoid "not only the errors of usage but mistakes of fact and language" (1988:3). This method of compensation, however, cannot apply to all areas in translation practice. Newmark believed that translators could avoid errors simply by "applying common sense and showing sensitivity to language" (1988:3), yet common sense and target language competence are not eligible in all circumstances. A sensitivity to the SC is highly valued for source texts with substantial cultural content, especially those with cultural references such as allusions and idioms. The translator, equipped with common sense and language sensitivity but a lack of sensitivity to the SC, would not necessarily recognise the cultural items, let alone translate them appropriately.

There has been a tradition for translators to work in a non-mother tongue language (Kelly, 1979). As Newmark (1988) mentioned, the main reason is to compensate for the shortage of L1 translators. In the name of contradiction between theory and practices, S. Campbell (1998) demonstrated that in many non-English-speaking areas, English native translators are hardly available. Conceding the preference of L1 translation, in theory, however, he emphasised the shortage of L1 translators to match the demand. In other words, the L1 translation, acceptable in theory by many researchers, poses some difficulties in reality: due to the lack of TT native translators, translation sometimes has to be undertaken into the L2.

De Swaan (2001) refers to the formation of today's languages as a galaxy in the universe, where 98 % of languages in the world are used by less than 10 % of people. Those languages, named peripheral languages, are referred to as satellites around a planet grouped around a central language, usually a region or country's national or official language. Like a sun circled by planets, supercentral languages, which are hierarchically higher than the central languages, are the languages used in former colonies

and those which are still used in politics, law and business aspects, having more than one hundred million speakers. As the national language of the People's Republic of China and the official language of many other regions, Chinese has more than 1.7 billion native speakers; therefore, it can be included in this category. While as for English, De Swaan (2001) names it a "hyper central language " (2001, p. 6) to hold the entire constellation together for the reason that it is a language with the highest "communicative potential" (2001, p. 6). Learners prefer to acquire a second language hierarchically higher than their first language for its higher communication value. Pavlovic (2010) indicates that 70 % of full-time translators or interpreters have more than half of their workload focused on L2 translation in Croatia. De Swaan (2001)'s model helps explain the large workload in L2 translation since the number of Croatian native translators doing Croatian-English translation has largely outweighed English native translators. It is believed that a similar situation happened in Chinese and English translation as Chinese is also hierarchically lower than English in de Swaan's model with the population of English learner in China reaching 400 million (Wei & Su, 2012). When the translation is done from lower hierarchy to higher one, for instance, from Chinese to English, there are very few L1 English translators who have high language/translation proficiency in Chinese. Therefore, the volume of translation into English is too great for the number of L1 English translators available, and the therefore L1 Chinese native translators need to cover L2 translation. In the China Translation Industry Report 2014, over 60% of Chinese translation companies have more than half of their work in L2 translation, from Chinese to English. 13% of those companies have 80% to 100% of their workload in L2 translation. The overall Chinese translation market development shows a trend of L2 translation outweighing the L1 (Translation, 2014).

However, filling the vacancies of L1 translators is not necessarily the only reason for the existence of L2 translation. Plunc (cited in Grosman, 2000) has questioned the mother-tongue principle, pointing out that due to frequent migration and other forms of mobility, the theory of mother tongue is outdated in the present day. He indicated that the statement in which only native speakers of the target language qualify as translators contradicts the existing practice since it is unrealistic for all the translators to have perfect linguistic competence in both the target and source languages, especially for those who are translating less dominant languages. Other translation scholars then supported his idea to ground the translation theory with real-life practices. Campbell (1998) believed that L1 translators often have difficulty comprehending the ST and are therefore unable to grasp the meaning of the original, causing some misunderstanding in translation. L. Beeby (1998) further supported this idea by stating that those who attach importance to native speaker competence in the culture and language of the TT often neglect the importance of these for the ST, especially when the

discourse patterns differ greatly from one culture to another. Criticising the theorists that favoured L1 translation, Grosman (2000) believed that they emphasised the translators' production of the TT while neglecting the importance of comprehending the ST. The undervaluation of SC comprehension, according to Grosman, implied that translators tend to devote less scrutiny and less effort to the integrity of the ST; this may lead to misinterpreting and mistranslation in the TT. Grosman (2000) discussed this issue about literary translation, in terms of adaption and appropriation. He questioned what kind of texts would be likely to be preferred by the reader, either one with all the familiar features of their native literary texts or one with precise information about the ST that seemed alien to them. The research showed that all alien cultural information is likely to be transformed into familiar features (Grosman, 2000). Therefore, when they are doing L1 translation, translators tend to dismember unfamiliar cultural information and adapt those messages with their familiar features. Thus, the TTs would be predigested texts, with translators' cultural interpretations. Kiraly (2000) also clarified that, although the translation into foreign languages may cause more difficulties for the translators, the comprehension of the ST can be "more nuanced and accurate" (2000, p. 117).

A similar idea can be seen in Pokorn's work which indicated that Venuti's lack of attention to translation into the non-mother tongue suggests that there is a superiority of translation into the mother-tongue in his translation theories. As a result, Venuti accepted the notion of superiority in the target language culture (Pokorn, 2000). Pokorn (2000) presented an analysis of word-level equivalence between different translation versions to illustrate how essential it is for translators to comprehend even a single word to provide the appropriate meaning of the original author and how important the ST is to the translation process. According to his analysis, when facing a translation difficulty, the L1 translator and L2 translator chose different approaches to transfer the meanings. The former failed to convey the author's intention in the wordplay and changed the original meaning by using misleading terms directly taken from the TC. However, the former's translation tended to be more likely to follow the norms of the TC and was thus more popular among target readers.

On the other hand, the latter correctly conveyed the underlining meaning of the author by using footnotes and paraphrasing to maintain the cultural diversity in the target language, but this makes the product appear too exotic or alien to the target language reader (Pokorn, 2000). From the cognitive perspective, Dimitrova (2000) indicated that in L1 translation, reading and comprehending a foreign language may require more cognitive resources, especially for student translators. Compared to the high criteria in translation acceptability, there are actually few checks about the translators'

comprehension of the ST. The ability of translators in reading and comprehending the STs was taken for granted, even though the differences between language and cultures are wide.

To conclude, the experts and public favour translating from L2 to L1 language over the other direction, and therefore name L1 translation as direct translation, even though the benefits of one or the other are still much debated. In L1 translation, the main challenge is ST comprehension. In contrast, coming up with a TT authentic to the target readers is the major issue to overcome in L2 translation. The main discrepancy between the two sides is whether the translator's ability to comprehend the ST has been emphasised and to what extent the ST information matters in the translation process. Some researchers considered naturalness and authenticity as vital norms in translation, while others, although a smaller number, believed that faithful comprehension of STs is equally essential in the translation process and, therefore, L2 translation should have a self-evident value.

2.1.2 Directionality and Lingua Franca

Similar to De Swaan (2001), who considered the English language as a "hyper central language", Snell-Hornby (2000, p. 37) pointed out that "it is particularly on the global level of supra cultural communication that translation into English as a non-mother tongue has become a fact of modern life." The words like global and supra indicate the global scope of English use; the status of English in modern times has lifted to a premier level. From a regional language owned by the native speakers of certain countries, English has already been globally used as a language of commerce and an international language. Non-English speaking countries see English as a contact language to communicate with the rest of the world rather than just with the native English-speaking world. Snell-Hornby (2000) has indicated that in present days, the phenomenon of the English language around the world should be re-interpreted. Lingua Franca English has become a reduced standardised form of language used for supra-cultural communication, losing its original identity, connotations and grammatical subtleties. Whilst continuing in a role as a global Lingua Franca, English is no longer "owned" by its native speakers, and meanwhile, researchers believed that non-native speakers are changing English, contributing to the innovative use of "unofficial" English (Cogo, 2012; B Seidlhofer, 2011; B. Seidlhofer & Berns, 2009).

A relevant point to be made here is that target readers of the translation are not always necessarily the target language native speakers, and the majority of L2 translation is for international consumption. L2 translators can competently deal with this kind of translation by clearly and accurately transmitting the intended message in the language. As a whole, native speakers are in the

minority for English use with a ratio of one to four; thus, it is more frequently used as the international language than national languages. Since English as Lingua Franca belongs to all the English speakers in a global context, both native and non-native, the target group of translation into English has changed from native speakers to all the English users. Furthermore, the target readers of translation into English as Lingua Franca is not limited to English users. McAlester (1992) perceived that translators who are non-native speakers of English might be as good or even better than a native speaker since a non-native translator may produce a TT that is more acceptable for the target readers of non-native speakers to comprehend. Discussed from the aspect of subtitling translation, Kovacic (2000) believed that English has developed into a superpower language and become a relay language in international exchange, mediating between two cultures that differ from the "inner circle" of English native or international English related ones. She specified that translation into English as a relay language is not for a particular target audience but for the second translator to work the English version into a final target language. She indicated that it is likely for the SC to get lost in the "English-culture-oriented translation" (Kovacic, 2000, p. 52).

Besides subtitling, Grosman (2000) believed a practical need for translating literary texts to international readers. In this case, such translation is not made to suit any particular target literary system, but mostly translated to world languages like English and targeted at international non-native English readers. The literary systems of less dominant languages represent their cultural specific differences from others; therefore, the native translator of the ST could offer a maximum understanding of the text to secure and preserve its cultural-specific features. Grosman (2000) further indicated that this kind of "otherness" features that come from translations offer readers insight into foreign cultures and help develop the intercultural awareness of the readers by establishing links between their own cultures and the foreign ones.

Like language, in the globalised "cultural franca" (Snell-Hornby, 2000, p. 39), the classification among cultures is no longer distinct and rigid but rather tangled and twisted. Combined with the theory of English as an international language, Snell-Hornby (2000) discussed translation into English as the non-mother tongue in translator training and professional practice. She demonstrated that the purpose of this type of translation training is not merely to serve as an exercise in working with foreign languages. Instead, it should be a training course for the translation profession, equipped with pedagogical textbooks and methods (Snell-Hornby, 2000). From her view of globalisation nowadays, translation is no longer a simple cultural transfer between two distinct language communities; translator training should be established within the framework of a "Cultura Franca". She approached

the L2 translation in translator training under Lingua Franca from four angles: textual, linguistic, pragmatic and cultural aspects. However, the last one presented most problems: “Metaphors, cultural-bound items, allusion and other cultural references are the factors usually adapted, explained or repressed in a Lingua Franca context” (Snell-Hornby, 2000, p. 39). The extent to which these cultural references are accessed, adapted, expressed or translated is one of the concerns to be explored in this thesis from the perspective of translators and translation productions.

For literary translation, Snell-Hornby (2000) agreed with the statement that in normal conditions, literary translators should only work in their mother tongue, but she also pointed out some exceptions for the people who live in multilingual countries or former colonies. Snell-Hornby agreed that rejecting Anglo-origin slang or idioms to explain culture-bound items originating from other minor cultures could be right since in narrative text in literary works, the English language cannot be fully neutral; it would potentially shape the ST cultural background in the target reader’s mind. It would be unnatural to use English idioms to replace the non-English ones; instead, other strategies could be used to explain (Snell-Hornby, 2000). She believed that it is hard to identify whether a native speaker of ST or TT is more qualified for the literary translation when dealing with a culturally related word or phrase.

2.1.3 Empirical Studies on the Directionality of Translation

To challenge the assumption of the mother-tongue principle theory, Pokorn (2005), following previous research (Pokorn, 2000), proposed questions concerning the quality of translation made by L2 speakers compared to native translators and the possible shortage of L1 translators. She indicated no empirical evidence to show that L1 translators contributed to high-quality translation, while L2 translators did not (Pokorn, 2005). Through the corpus analysis, she evaluated the quality of several literary texts translated into English and explored if the quality of translation correlates with the native language of the translator. The texts she chose came from a famous Slovene work translated into English at different times and by different translators. She reasoned that if the theory of the mother–tongue principle is valid, then the quality of English native translators’ work would surpass that of non-English translators. However, results showed that the quality of the translation from non-English translators is not worse, if not better, than the L1 translation, indicating no correlation between the quality of translated work and the direction of translation. Pokorn (2005) then conducted a questionnaire survey on native reader response to the selected translated text and concluded that there is no significant difference between native and non-native translators’ works since the participant cannot identify whether the translators are English native solely from the texts themselves. Therefore, she believed that the quality of the translation, the accuracy and the

acceptability of the language in the TT depends mainly on “the individual capacities of the particular translator, the translation strategy and the understanding to the source language and culture (Pokorn, 2005, p. 121)”. However, it would be more helpful if Pokorn considered the possibility that although being translated by non-native translators, those published texts could be modified by native speakers before the publication. Therefore, the published translation work is likely to be a product of collaborative work rather than a translation solely from the translator. Consequently, using published translation works to investigate the quality of the work and the proficiency of the translator through a reader response questionnaire would be less convincing. Another concern about this study is the criteria Pokorn used to evaluate the quality of the translation. It would be even better if she had provided an explicit statement of the quality assessment, including the procedure, criteria and objective evaluation.

N. Pavlovic (2007a) aims to examine directionality mainly from the perspective of problems encountered by novice translators during the process in two directions. She hypothesis that L1 and L2 translation differ not only in product but also in the process of translation. Besides the quality of the final product, her proposed research questions concern the kinds of problems encountered, the amount and distribution of those in each direction, the solution and external resources translators may consider or consult. The research participants are novice translators; Croatian as L1 and English as L2 in higher competence. The STs are two non-technical paragraphs: one in English and one in Croatian, and are comparable in approximate length and readability. Instead of focusing on individual participants one at a time, Pavlovic adopted what she called the “collaborative translation protocol” (2007a, p. 2) to record verbal reports from collaborative or group translation sessions and set a control group, individual translation, to compare their results with the collaborative groups. Intending to improve translation education, the researcher believed that exploring the discussion process of group translation would benefit the training of translators. According to N. Pavlovic (2007a), the discussion of collaborative translation as opposed to individual, the conclusion has many similarities. In collaborative tasks and L1 translation, the TT tends to have better quality and greater fluency than the other mode, while individual and L2 translation share the same weaknesses and have fewer attempts and lower quality of translation products. Based on those findings, N. Pavlovic (2007a) inferred that collaborative translation could benefit L2 translation as the collaboration provides more solutions to choose from, at least in an educational context. The research findings showed that novice translators tend to encounter similar problems regardless of direction and conclude that the type and number of translation problems would not be affected by directionality. Nevertheless, the directionality influences the choice-making of the translation process, the quality of the TT, and the

consulting process. For instance, in the L1 translation, the translators are more likely to find internal resources for help, while in L2 translation, they tend more frequently to consult external resources like online resources and dictionaries. Meanwhile, TT in L1 translation tends to be more fluent and has reached a higher quality standard than the L2 translation. Her results also proposed doubt on the L1 comprehension advantage for translation: Is it easier to comprehend the STs in the L1 translation? Similar findings have been reported by Obdržálková (2016), who looked at the decision-making of the professional translators, and the research implied that translators also encountered comprehension problems in ST in L2 translation. It would be wondered whether the novice translators would face the same or even more severe comprehension problem in not only L2 but also in their L1 since the comprehension of allusion might require advanced cultural knowledge.

2.1.3.1 Directionality and Cognition

A growing interest has been shown in various aspects of directionality, including human translation (Ferreira, 2014; Ferreira & Schwieter, 2017; Ferreira et al., 2016; R. Gong, 2014; Wang, 2017), post-editing (Sismat, 2016), interpretation (Du, 2014; Gumul, 2017) and sight translation (Shuai, 2015). Researchers have gradually realised the importance of L2 translation in the field and regard directionality as one of the variables when exploring translation topics, such as translation competence (Bartłomiejczyk, 2006; Pavlović, 2013; Shlesinger, 2003), translator training (Malkiel, 2004; N. Pavlovic, 2007a, 2010; Pavlović, 2013), and literary translation (Bahrami, 2012; Wang, 2017). As the technology has developed, the focus has shifted to the cognitive mechanisms rather than behavioural studies, and various methods have been applied to unwrap the “black box” of translators' minds, including key-logging (Buchweitz & Alves, 2006; Ferreira, 2012; Malkiel, 2004), eye-tracking (e.g. Chang, 2009; Ferreira et al., 2016; Wang, 2017) and fMRI(Chang, 2009).

Directionality and key-logging

In the early study of Jakobsen (2003) investigating the effects of think-aloud protocols on the translation process, directionality was seen as one of the concerns in process-oriented research. The findings were quite inspiring for further studies, as Jakobsen found the L2 translation was about 16 % slower than the L1 translation for both groups of participants, no matter whether the participants were professional or not. The findings confirmed his hypothesis that there would be more segmentations in the L2 translation than in L1, suggesting that there are more pauses in L2 translation than in L1 translation. This thesis will testify whether a similar conclusion can be made in English-Chinese translation and extend the research on pause analysis between two directions.

Buchweitz and Alves (2006) triangulated key-logging and screen recording software and think-aloud-protocol data to study translators' online revision and segmentation pattern on TT in English and Portuguese (L1) translation processes in both directions. In their study, participants from the novice and semi-professional groups took more time in L2 translation and presented more segments and revisions in this direction. This finding confirmed the statement made by T. Pavlovic (2013) that to produce a satisfying translation, the L2 translators would invest more time and effort than the L1 translators. Ferreira (2012) partially replicated the study of Buchweitz and Alves (2006) on professional translators in light of cognition theory. In her study, time, pause, segmentation and revision were analysed to measure the cognitive efforts of professional translators. Her early research showed that the translators tended to produce smaller segments in the L2 translation, forming a larger amount of segments and more translation on lower-level words (Ferreira, 2012). According to Ferreira Ferreira (2012), the smaller but higher number of segments indicated that translators would invest more cognitive effort in L2 translation.

However, the conclusions did not coincide with all relevant research. Malkiel (2004) investigated this issue from the perspective of the impact in difficulty on the two directions of translation. She believed that various types of problems and degrees of difficulties lead to different strategies used in either direction. Therefore, she presented an inter-group study, where two groups of participants translated a Hebrew text with one group of English speakers and the other Hebrew speakers, recording the key-stroke and pause from the translation process. In her findings regarding the two objective measurements of difficulty, textual and lexical difficulty and the difficulty in the process, the L1 translation required less time on average than L2 translation but produced more additional key-strokes than the latter. Moreover, the participants who translated into L1 considered the texts easier than those who translated into L2. From the findings, Malkiel (2004) concluded that L1 translation is not necessarily easier than L2 translation as it is less time-consuming but more intensive as it contains more key-strokes. The reason for the discrepancy, as indicated by Malkiel (2004), might be due to different language pairs, participants' translation expertise and some other factors; this thesis will compare the translators' effort in two directions through revision number, pause number and pause length to either confirm or reject the former findings.

Directionality and eye-tracking

N. Pavlovic and Jensen (2009) introduced eye-tracking technology to explore the effects of directionality through measuring the indicators of cognitive effort[2], task length, gaze time, average fixation duration and pupil dilation. They recruited both student and professional translators to translate Danish into English (L1 translation) and English into Danish (L2 translation). The participants varied in levels of second language competence and experience in translation, and thus the level of training and experience is likely to play a role in the research. The results suggested that firstly, shown by the relevant indicators, the translators tend to devote more cognitive effort to TT processing than to ST in both directions. N. Pavlovic and Jensen (2009) hypotheses that since in L1 translation, the ST is the participants' second language, the processing of the ST should be more demanding in L1 translation than in L2 translation. Surprisingly, this hypothesis was not entirely confirmed. The researchers demonstrated by this evidence that the construction of ST meaning is as demanding in L2 translation as in L1 translation. Also, the hypothesis that L2 translation required more cognitive load than L1 in both groups was not entirely confirmed by all four indicators. In the student translators' group, data from the gaze time and the average duration rejected this hypothesis, meaning that L1 translation required more cognitive effort than L2 for student translators. From the student group data, the researchers found ambiguity in the discrepancy between the indicators of cognitive effort in two directions, which means that for the student translators, L2 translation is not necessarily more difficult than L1 translation. This finding mirrored the one drawn by N. Pavlovic (2007b), stating that students subjectively believed that translation into a second language is easier than translation into a first language. A similar survey will be conducted among the student participants; it would be interesting to see whether the student translators from other cultural backgrounds would hold the same point of view on directionality.

Ferreira et al. (2016) undertook another study concerning professional translators' performance in L1 and L2 translation between English and Spanish by exploring the cognitive effort with the technology of eye-tracking equipment. The total time spent, fixation duration and average fixation duration were analysed as an indicator of the cognitive process, and the fixation count in ST, TT and browser (external support) were measured. From the research, Ferreira et al. (2016) found that although all four participants spent more time on L2 translation, they presented a lower fixation count in L2

[2] Cognitive effort, or its interchangeable term cognitive load, is defined as 'the amount of available processing capacity of the limited-capacity central processor utilized in performing an information-processing task' (Tyler, 1979). In short, it refers to the cognitive energy spent on understanding certain tasks, mostly measuring by time, pause, segmentation and more recently eye-movement tracking.

translation, which means they devoted less attention to L2 translation than to L1 translation. Ferreira et al. (2016) hypothesised that participants would invest more attention to the ST in L1 translation as the ST is the foreign language in this direction. Meanwhile, they focused more on the TT in L2 translation for the same reason. As she assumed gaze time as an indicator of the cognitive effort, three of the four participants presented longer dwell time in the ST than TT in L1 translation, indicating that they paid more attention to the ST.

On the other hand, when the participants were doing the L2 translation, they surprisingly invested more effort in the ST than in the TT. The similar patterns revealed in both directions, more attention on the STs than on the TTs, indicated that the translators invest more thinking in accurately understanding the ST in the original culture to convey the information correctly, no matter what the language is Ferreira et al. (2016). However, this statement was precisely the opposite of the conclusion made by Pavlovic and Jensen, demonstrating that translators paid more visual attention to the TT. The reason for the discrepancy remains unclear, but, likely, the translators' experience and the different language pairs (Spanish-English and Danish-English) contribute to this inverse conclusion. In addition, the insufficient number of participants in the Ferreira study should not be overlooked as it may lead to inadequate conclusions. Ferreira also explored the external resources that translators may adopt in both directions. However, as the diversity of personal patterns and time length in using external resources cannot be observed from the eye-tracking technology, it is not statistically reliable to compare directions individually. Nevertheless, the total dwell time of the four participants on external resources is higher in L1 translation than in L2 translation, which is just the opposite of the researcher's assumption. She interpreted it as the translators' higher criteria of lexical choice, finding the most appropriate vocabulary from the external resources since the produced language (TT) is the translator's first language. It remained unclear whether the external resources in L1 translation required more attention than in L2, and the possible causes may affect the CE to external resources in both directions. The present thesis, therefore, aims to resolve this doubt.

2.1.3.2 Directionality of Translation on English and Chinese

Chinese, isolated from the minor languages mentioned above, differs from English. As a non-alphabetic language, it presents as square-shaped, logographic text unique from most languages and thus, it is worth investigating compared to alphabetic languages. However, there is a severe lack of empirical research on the directionality of Chinese translation studies. Based on a brief comparative case study of the English translation of Wenxin Diaolong, Shi (2013) pointed out that the L2 translation is as legitimate and feasible as L1 translation in China since the proponents of L2 translation doubt whether the sinologists could deliver a complete and authentic portrait of Chinese

culture and Chinese literature to the rest of the world. Besides, Shi (2013) argued that the assessment of the quality of translation should be based more on the translation competence and translation strategy than the language affiliation of the translators. He also believed that the direction of translation should not be the prior factor in the evaluation of translation work and concluded that in a country like China, whose culture needs to be introduced to the outside world, inverse translation is needed as there are not enough sinologists to do the work.

To test the applicability of cognitive methods in the area of translation and interpretive studies, Chang's research explored the validity of the Revised Hierarchical Model (Kroll & Stewart, 1994) at a text level and whether it can be extended to this level by collecting data on the cognitive load from novice translators and interpreters (Chang, 2009). Kroll and Stewart's model suggested that translating single words into an L2 required more cognitive effort than into an L1. In this case, L2 translation on word level is more cognitively loaded and may cost more time and effort. Chang adopted the eye-tracking technique to investigate the physiological reaction of novice translators. He did not restrict the language pair to one group but extended his study to English-Chinese translation and English-Spanish translation to confirm whether the conclusions on alphabet-based language translation can be generalised to an ideogram-based language or vice versa. In the English and Chinese eye-tracking experiment, there were 16 novice translators, having Chinese as their first language and English as their second. The eye-tracking and fMRI data showed that the L2 translation is more cognitively demanding than L1 translation for Chinese novice translators; the data also agreed with N. Pavlovic and Jensen (2009) that translators paid more visual attention to the TT. Therefore, Chang inferred that translators tended to devote more effort to ensure the translation production's accuracy. However, the results of Chang only partially coincide with Pavlovic and Jensen's work since the experiment conducted between English and Spanish failed to confirm such a trend. Due to the different language pairs, the level of ST difficulty or the translation expertise of the participants, the findings of the two researchers may vary. The different findings of the previous studies are also motivations to the present thesis in expecting different or coinciding results from the previous ones.

The controversy between the norm of L1 translation and the application of L2 translation in practice stimulated the discussion on the directionality in translation studies. For those countries whose languages are of "limited diffusion (Whyatt & Pavlovic, 2021, p. 1)" but willing to promote their cultures, the research towards directionality is becoming increasingly topical with the worldwide dominance of English. It is potentially valuable to find out the cognitive difference between the two directions of translation to improve the training pedagogy towards the two directions efficiently.

Meanwhile, Grosman (2000) indicated that the public assumed that native speakers involved in translating are highly proficient in their L1 language and well acquainted with their own culture to produce better TT than the L2 translators. However, as discussed earlier, the comprehension of ST is of the same significance, if not more, than the production of the TT. In the case of literary translation that requires a profound knowledge of ST culture, whether the translators can deal with unfamiliar culture-bound terms in their L2 language remain in doubt, especially for allusions, as the intertextual elements carry culture-specific meanings.

2.2 Translation of Allusions

Implicitness is traditionally considered the main characteristic of allusion. Roukonen (2010) defined it as a reference that contains implicit meanings that link to its referent text or a part of it. Although they convey implicit meaning, some allusions take explicit forms, e.g. a Proper name allusion, and they can be overtly recognisable in the allusive texts. In contrast, some others, e.g. Key-phrase allusions, are not signalled by any "hints" and are unnoticeable in the allusive text, especially to the readers who are not a part of the language and culture context. Therefore, although very limited in quantity, studies always explore the translation of allusion from the perspective of readers to see how the TT readers accept the ST allusions (C. Campbell, 2015; Chen, 2018; Leppihalme, 1997; Pedersen, 2007; Pirnajmuddin & Niknasab, 2011) or looking at the translated allusion, to see whether the translators prefer certain kinds of strategies (Bahrami, 2012; Dastjerdi, 2008; Khadem & Vahid Dastjerdi, 2012; Rahimkhani & Salmani, 2013; Roukonen, 2016). Nevertheless, this thesis aims to analyse the process of translating the allusion to find out what the translators were thinking during the process of translating allusions and what factors might affect their decision-making.

2.2.1 Allusion as Intertextual Element

Intertextuality refers to the interconnection between similar or related works of literature and can be seen as a literary device that creates an "interrelationship between texts" and generates related understanding in separate works. The normally accepted framework of intertextuality that studies the interconnection between texts was coined by Kristeva (1986), who stated that any text is a mosaic of quotations; any text is the absorption and transformation of another (Kristeva, 1986, p. 37). There are always other words in a word, other texts in a text. The concept of intertextuality believed texts are to be treated not as self-constrained systems, but as differential and historical, as traces and tracing of otherness since they are shaped by the repetition and transformation of other textual structures. Dating back to 1981, De Beaugrande (1981) had categorised intertextuality as one of the seven standards of textuality and pointed out that the dependence on other texts can be seen through

implicit and explicit references like allusion. Similar to Bakhtin's (1981) idea that discourse can be gained through experience in a language, Halliday (2002) has viewed intertextuality as a part of the history of the text and allusion as the only intertextuality element in literary texts.

The translation itself has been considered as one form of intertextuality activity. As Venuti (2009) pointed out, translation is how translators decontextualise the ST's origin and contextualise the TT, and intertextuality is essential throughout the process. Besides transferring meanings, translators build up a new intertextual relation acceptable for the TC and readers by replacing the relation with the source's cultural context. The relation is not limited to the lexical level of replacement but also to textual, contextual and cultural levels that reflect the cultural significance of the source intertext. Venuti (2009)'s interpretation of the intertextual relation in translation contains not only the relation between ST and TT, but also the ST and other texts which are linked to the ST by the original author, and the TT and other texts that are linked to the TT by the translators. Bassnett (2007), from the perspective of cultural translation, proposed the same idea that it is impossible to comprehend any single piece of literature without considering other literature. Tian (2008) further added that it is expected that the intertextual relation of the ST can be simulated in the TT by translators while making the target reader fully able to comprehend the TT; therefore, translators have to create intertextual relationships in TT which do not exist in the ST.

If we see allusion as an element of intertextuality and translate it within texts, there comes a problem with how the translators deal with the intertextual relations of the allusion and deliver the relationships to the target reader in a comprehensible way. Nevertheless, it would be more interesting to determine whether there may be any difference in the translators' approach to allusion between translation directions since the translators can be either an insider or outsider in the L1 and L2 translation.

2.2.2 Allusion as Cultural Reference

Cultural reference, in translation studies, refers to certain kinds of concepts and objects in an ST that exist in one culture but not in another and therefore have no adequate equivalence in the TT. A variety of terminology on this kind of cultural-specific element has been introduced by researchers like realia (Vlahov and Florin,1969, cited in Ranzato, 2013), cultural-specific word (Olk, 2001), culture-bound element (Salo-oja, 2004), and cultural reference which is widely accepted by researchers and therefore, adopted in this thesis. Similarities can be found between allusion and cultural reference in that, firstly, most cultural references contain implicit meanings, and secondly, cultural references can be used for stylistic effect and characterisation. At the same time, allusions can rely on connotation or

become stereotyped (Leppihalme, 1997), just like cultural references. Kosunen and Väisänen (2001) classified cultural-bound terms as being a part of allusion (cited in Ranzato, 2014), like cultural allusion, while Ranzato (2013) saw the allusions as a special kind of cultural reference. What differentiates them from other references, according to Ranzato, is that allusions create a special relationship between the audience and the text itself to presuppose the assumed shared knowledge of the target audience to make associations and thus reach the intended meaning. Not every person in society will recognise or grasp the meaning of a cultural reference or allusions since they do not directly connect with the cultural element from reality but make a second-hand link with the items from other texts or works that have familiar cultural meanings for the audience. Roukonen (2010) believed allusions to be similar to "culture-specific items", or "words and combinations of words denoting objects and concepts characteristic of the way of life, the culture, the social and historical development of one nation and alien to another" (Florin, 1993, as cited in Roukonen, 2010).

Due to the culture-specific attributes of the allusion, Leppihalme (1997) named it "culture bump". This was initially raised by Archer (1986), who used culture bump to refer to "cases where an individual from one culture finds himself or herself in a different, strange, or uncomfortable situation when interacting with persons of a different culture"(1986:4). It is not as severe as culture shock, but it could also be problematic if further guidance is not provided. There is no doubt that, in most cases, target readers who live in a different cultural environment would be unlikely to recognise the SC allusive terms, even to make connections and comprehend the intended meanings. Leppihalme (1997) investigated how to deal with the culture-specific allusions and proposed practical strategies for the translators to tackle this problem.

Leppihalme considers the allusion more like a translation problem than a literary device. Leppihalme (1997) categorises the allusion into three broad types, and this thesis focuses on the allusion proper, which most frequently appear in the literary translation.

> *Allusions proper:*
>
> *Proper-name allusions—allusions containing a proper name (e.g. He is such a Casanova.)*
>
> *Key-phase allusions—allusions containing no proper name (e.g. To study or not to study, that should not be the question.)*
>
> *Stereotyped allusions:*
>
> *Allusions in frequent use have lost their freshness and do not necessarily evoke their sources (e.g. You have to know that Rome is not built in a day.)*

Other kinds of allusions:

Semi-allusive comparisons (SACs)—superficial comparisons or looser associations (e.g. Like the land of Oz, artificial intelligence has good and bad witches.)

Eponymous adjectives (adjectives derived from names) which do not form fixed collocations with their current headwords (e.g. Victorian architecture is a series of architectural revival styles in the mid-to-late 19th century.)

Considering proper name allusions as to the most frequently used type, Leppihalme (1997) proposes a set of potential strategies targeting allusions derived from her reflections on specific examples. The list of problem-solving strategies aims for an effective way to guide the translators to achieve a satisfying solution with minimum effort (Leppihalme, 1997), and therefore the order of the strategies is organised from the most retentive strategies to the most modifying ones.

Strategies for translating proper-name allusions *(Leppihalme, 1997:79)*

1. Retention of the name:

a. Using the name as such; b. using the name, adding some guidance; c. using the name, adding a detailed explanation, e.g. a footnote.

2. Replacement of the name by another (beyond the changes required by convention):

a. replacing the name with a TL name; b. replacing the name with another SL name.

3. Omissions of the name:

a. Omit the name but transfer the sense by other means, e.g. common noun; b. Omit the name and the allusion altogether.

Strategies for translating key-phrase allusions (Leppihalme, 1997, p. 84)

A. Use standard translation;

B. minimum change, e.g. a literal translation, no change that would aim specifically at the transfer of connotations;

C. Add extra-allusive guidance to the text, where the translator follows his/her assessment of the needs of TT readers by adding information;

D. the use of footnotes, endnotes, translator's prefaces and other explicit explanations not slipped into the text but overtly given as additional information;

E. Introduce textual features that indicate the presence of borrowed words;

F. Replace with a performed TL item; [3]

G. Rephrase the allusion with an overt expression of its meaning;

H. Re-create the allusion by creatively constructing a passage that reproduces its effects;

I. Omit the allusion completely.

Leppihalme's model, on the one hand, is novice-friendly for translators who are dealing with the problems of rendering allusions, as it provides a detailed classification on how the allusion can be translated and is well accepted by researchers working on the translation of allusion. Thus, in the present thesis, this model has been applied as the framework to analyse the strategies adopted by the translators. On the other hand, allusion translation is far more complicated than simply answering binary questions and coming up with solutions. Researchers have proved that many more factors influence the choice of strategies translators use when dealing with allusions, for instance, the translators' purpose, readership, and translation competence (see Salehi,2013; Bahrami 2012; Desmet 2001). Furthermore, the strategies Leppihalme raised would mostly be applied between the translation of languages, either sharing similar alphabetic system or culture sources, like Polish and English. Some strategies might not be applicable for languages that are remotely related to each other. For instance, retentive strategies cannot be easily realised in translating proper-name allusions between Chinese and English since the two languages do not share the same alphabetic system. Thus, a slight modification is required before adopting Leppihalme's model for this thesis. The revised lists of strategies are shown as follows. Modifications on the strategies model have been underlined:

Strategies for translating proper-name allusions

<u>1. Use of standard/existing translation</u>

2. Retention of the name:

a. using the name as such/<u>transliteration</u>; b. using the name, adding some guidance; c. using the name, adding a detailed explanation, e.g. a footnote.

3. Replacement of the name by another (beyond the changes required by convention):

a. replacing the name with a TL name; b. replacing the name with another SL name.

[3] "replacement by better-known SL item" has been mentioned by the Leppihalme but not include in the lists since she believed it being "of no practical value with KPs" (Leppihalme, 1997, p. 128)

4. Omissions of the name:

a. Omit the name but transfer the sense by other means, e.g. common noun; b. Omit the name and the allusion altogether.

Strategies for translating key-phrase allusions

A. Use standard/existing translation;

B. minimum change, e.g. a literal translation, no change that would aim specifically at the transfer of connotations;

C. Add extra-allusive guidance to the text, where the translator follows his/her assessment of the needs of TT readers by adding information;

D. the use of footnotes, endnotes, translator's prefaces and other explicit explanations not slipped into the text but overtly given as additional information;

E. Introduce textual features that indicate the presence of borrowed words;

F. Replace with a performed TL item; [4]

G. Rephrase the allusion with an overt expression of its meaning;

H. Re-create the allusion by creatively constructing a passage that reproduces its effects;

I. Omit the allusion completely.

Firstly, "transliteration" has been added to the list of strategies for proper-name allusions. Due to the morphological differences between Chinese and English, some lexical and orthographical changes have been made. Therefore, simple retention of the proper name allusion cannot be realised between Chinese and English translations but requires the transliteration or change of forms for proper name allusions. Translators would translate the allusion by creating TL words that are phonologically similar to the SL allusion. For instance, in English to Chinese translation, they tend to find Chinese characters that sound similar to the English proper-name allusion when no other strategies can be resorted to. Secondly, "standard translation" has been added, although Leppihalme (1997) did not include it as one of the strategies to translate proper name allusions. In practice, some translations of proper-name allusions have been widely or even universally known and accepted. Many well-known English proper name allusions have been unified in their Chinese translations for more efficient intercultural communications with minimum efforts. Another modification on both the

KP and PN allusions is the introduction of "existing translation". This concept is raised by Roukonen (2010), as with most KPs and a small number of PNs, there might not be a "standard" translation as the only accepted version. Considering all the factors, e.g. Skopos, readership, the translators need to identify the most suitable ones that fit both the TT and the context of the allusive text.

2.2.3 Research on the Translation of Allusions

Gale (2000) points out that the identification of allusion is the process of interpreting intertextual resemblances. Before solving the problem, one should first recognise it. However, identifying the allusion would be demanding for the translators, especially for the L1 translators, where the ST tends to be in foreign languages and often relates specifically to the cultural capital in that language. If the translator misses the instance of intertextuality and is simply "taking it for another stretch of text", they would, in most cases, fail to convey it adequately to the target readers. Even for the ST readers, identifying the allusion could be challenging. According to Irwin (2002, p. 521), allusions "typically draw on information not readily available to every member of a cultural and linguistic community".

Pedersen (2005) proposed the Transculturality Model, which includes three levels of cultural references based on the degree of familiarity of the ST and TT readers. A transcultural extralinguistic cultural reference (ECR) is considered common encyclopaedic knowledge to ST and TT readers and no longer belongs to the SC. Monocultural and Microcultural ECR, on the other hand, constitute the majority of allusions used in translation studies, referring to the Allusion proper in Leppihalme's (1997)'s model. Monocultural CRs are bound to the SC and belong to the encyclopaedic knowledge of the ST readers, whereas those CRs are less identifiable to the TT readers and therefore require the translators to decide whether and how to transfer both the intertextual and cultural meaning from the ST to TT comprehensively to the TT readers by resorting to different translation strategies. As Pasco puts it (2002, p. xi), "Allusion occurs throughout literature though it frequently escapes attention, resulting in misreading and misinterpretations." As Microcultural CRs, compared to the monocultural ones, are more specialised or local, relevant to a smaller group of ST readers (e.g. Candide, for those who read Voltaire's work). A similar concern was raised by Bahrami (2012), who analysed the application of Leppihame's summarisation of translation strategies on allusions in poetry. She argued that even readers in the same cultural community might fail to recognise the allusive expressions in a text. Thus, if we see this issue from the perspective of directionality, translators who are native speakers of the ST are more likely to comprehend the allusions and their embedded information since many allusions are monocultural or even microcultural references. Compared to the ST native translators, identifying the allusion could be the first obstacle to overcome for translators who are non-native source language users.

Once identified, the translation of allusion is the next obstacle. Liu (2012) addressed this issue from the perspective of translation aesthetic, proposing a four-stratum principle for the translators in dealing with allusions. The translator should be aware of, firstly, the semantic content carried by the words in an allusion; the superficial meaning that can be understood by literal transference. Secondly, It is the cultural aesthetic that emphasises the visualisation, structural form and the style of the allusion (and the text it embedded); especially in the literary translation, to retain or recreate the aesthetic in the TT. The third one refers to the origin and the source of the allusion, or story, according to Liu (2012); the source of the allusion benefiting in understanding not only the allusion but potentially the SC. The last and the most pivotal one is the extra-linguistic meaning or intended meaning of the allusion; to answer the question "what this allusion refers to?". Translators should negotiate between the strata, either to retain, to modify or to omit. Several studies have been done to analyse how the translators deal with the allusion: whether the translators should fully deliver the intertextual and cultural relationships of the allusion to the readers or whether the translators should leave space for the readers to independently enjoy the allusion information (Bahrami, 2012; Desmet, 2001; Kuleli, 2014; Pirnajmuddin & Niknasab, 2011; Roukonen, 2010). More importantly, it is worth looking at what strategies they might have adopted to translate the allusions and what factors motivate their decision-making.

2.2.3.1 Strategies for Translation of Allusion

Exploring the translation of Persian poetry, Bahrami (2012) found that the most frequent strategy for allusion is to use the name without any explanation and literal translation without the inclination to change to the original structure. The translators preferred a foreignization approach, which "leaves the writer in peace as much as possible and moves the reader toward him" (Schleiermacher, 2004:49). It preserves the allusion's original intertextual and cultural relationships; however, it would be unlikely for target readers to grasp the authors' intended meaning. Bahrami (2012) criticised the translators' choice of a foreignizing strategy to translate allusions may prevent the target readers from receiving the connotation that the original author intended to express through the allusions. Bahrami (2012) suggested that translators adopt more extensive strategies to convey implied references to the readers. The biggest problem for translators, according to her, is to infuse intertextual references into the target language and culture, ensuring that the meaning in the STs can be preserved and transferred to the target readers to the maximum extent possible.

Adopting the reader-oriented approach, Kuleli (2014, p. 212) brought the research on intertextuality translation to another level, believing that the satisfied TT should provide the "same satisfaction" to its readers as the ST to the ST readers. Although Bahrami (2012) has indicated the necessity for

equivalent effects (Nida, 1964) to be re-established for the TT readers compared to the ST readers, offering them the satisfaction to enjoy the intended meaning rather than simply transferring the literal meanings. Kuleli (2014) stressed the equivalent effect from another perspective: the blank thinking space that should be left for the target readers. In other words, he believed that implicitness in the ST caused by allusions should remain in the translated text and leave room for the target reader to receive similar pleasure from allusions. His idea partly echoes the study of Salehi (2013), in that many of the allusions, were retained as they were and could provide another perspective to interpret the allusion translation. After comparative analysis, Kuleli (2014, p. 208) concluded that some allusions were being translated with explicitation, leaving no room for the target readers to figure out the intertextual elements. He proposed the term “retroactive reading”, which forces readers to recall the previous texts, stimulate their own experience, and develop their understanding of the allusions, which he believed could bring joy to the readers. It is believed that the purpose of allusions is to enrich and intensify the readers' involvement in the text. However, it is difficult to achieve a similar effect of allusion in translation practice. Firstly, the notion of an entirely equivalent effect is unrealistic as it ignores the loss of contexts in translation (Venuti, 2009). Secondly, the extent to which an allusion should remain implicit would vary due to different purposes and targets within the translation. For instance, readers for leisure reading are likely to regard retroactive reading as interruptions to the reading process since the purpose of retroactive reading going for the sub-texts structure is not likely to be the same for leisure reading. Leisure readers would focus on fluency, and the contents of reading and proper names would be obstacles in reading if they are not explained clearly. No over-interpretation does not refer to translating literally without any explanation; adding a footnote would be helpful to understand certain proper noun allusions, for example. Although some translators consider translation together with footnotes undesirable, it has the potential to convey the concept as it could assist the target readers to make better judgements about the ST contents (Bahrami, 2012). Moreover, it provides the target readers with extra options as to whether or not to skip the further meanings of the noted word and continue with reading, or to find out more about the intertextual relationship.

Pirnajmuddin and Niknasab (2011) have explored the strategies used to translate allusions, both PN and KP allusions, by comparing the three translations of a political novel from English to English Persian. This quantitative comparative study was done according to the strategies of allusion translation proposed by Leppihalme, aiming to find the similarities of these translated versions of the translation strategies and whether those strategies appeared to be frequent and efficient. They concluded that the minimum amount of omission found in the translations of both kinds shows that

the translators' awareness of the importance of allusion and the retention strategies for proper noun allusion received the highest frequency in all versions. In the translation of key-phrase allusions, translators mostly adopted the literal meaning. However, the strategies of additional explanation and adding footnotes are more precise and comprehensible (Pirnajmuddin & Niknasab, 2011). In Khadem and Vahid Dastjerdi (2012), research on comparative analysing of two translated versions of a Persian poem, strategic marking and italicising allusion in translation with added footnotes is claimed to be the best strategy to give readers the closest meaning of the original source when the two languages and cultures have a huge gap between them (Khadem & Vahid Dastjerdi, 2012). However, since both studies analysed translation production, the reasons for choosing specific strategies remained unclear.

In the research of Desmet (2001), the impact of Skopos on the translator's decision-making can be seen from his analysis of the intertextuality of children's literature translations. Desmet (2001) found that two main strategies would be adopted towards intertextual elements like allusions when translating children's literature. Translators would translate the allusion literally when finding it meaningless or likely not to be grasped by the prospective readers (children), especially when it came to a proper name. Translators are also likely to use substitution to replace a target cultural reference that works within the TC or to compensate by creating links that can be understood by the children, depending on their knowledge. Desmet (2001) stated that the translators would assess the degrees of familiarity with the intertextual references of target readers before performing the translating activity. It is emphasised in the translation activity that function is supposed to be fulfilled in the TC. Thus, the determining factor in translation is not the ST or source situation but the purpose of the TT in the target situation. Translators will adopt different strategies of translation when they face different translation purposes and readers. In children's literature, the major audience would be children who may have limited knowledge and familiarity, even with their native cultural references, and their repertoire would be very different from adults. Therefore, translators should be sensitive when applying different translation strategies.

Ruokonen (2010), from another perspective, contributes to the factors that may lead to specific strategies that the translator would resort to. From their research on cultural and textual properties in allusion, Ruokonen (2010) observed the correlation between the translation strategies and the familiarity of the allusions to the target readers through qualitative analysis from hundreds of allusions in five novels their translations. For instance, retention strategies tend to be adopted when the translators render an allusion that is culturally familiar to the target readers or is coherent within

the TT context. In contrast, modifying strategies are more likely to be employed on unfamiliar source allusions or those with incoherent textual properties. Roukonen (2010) research could partly explain why translators choose certain strategies rather than others, yet cultural familiarity is definitely not the only motivation for decision-making. This thesis will, therefore, identify more potential rationales that contribute to the choice of translation strategies.

2.2.3.2 Translation of Allusion between English and Chinese

Studies have shown that the strategies proposed by Leppihalme are the most comprehensive and frequently cited model at present, while Oh (2016) found that the translation for some other language pairs would display differently from those Leppihalme proposed. In his research concerning English translations of Korean allusions, Oh (2016) noted that some strategies that appeared in the Korean-English translation were not mentioned by Leppihalme; for instance, adding endnotes for key-phases allusions and replacing allusive phrases with well-known source language idioms or phrases (Oh, 2016). Furthermore, more differences were found in the frequency of usage of the strategies: the most frequent "minimal change" reported by Leppihalme was rarely found in Korean allusion translations while increasing amounts of additional information in the context rather than to the allusion itself was observed in the text. According to Oh (2016), the discrepancy can be attributed to the large gap between the two languages and the asymmetry in shared cultural knowledge between source readers and target readers (Oh, 2016). The same circumstance happened between English and Chinese, as the Anglo culture, being globalised with the increasing use of English by Chinese people while Chinese culture, especially ancient Chinese culture, is far less accessible to English native readers. Due to this reason, many classical allusions are embedded within the modern Chinese language; it makes the translation of cultural allusions and related studies like translation strategies crucial in the research field.

Seeing allusions as part of the idiom, Fan (2007) investigated the translation problem of Chinese idioms under the context of cultural studies through a comparative analysis between a classical Chinese novel and its two English versions, one from an English translator and one from a Chinese translator. Chinese allusions usually reference characters or events from history, legends, literature, and religion, deeply influenced by Confucian culture and Buddhism. What makes the allusion translation difficult are firstly the cultural variation as this makes the allusions more complicated, even for the Chinese native speaker and secondly that translators have to maximally retain the literal meaning and at the same time guarantee the transference of the pragmatic meaning to create effective cross-cultural communication. Fan (2007) believed that factors like culture, cognition, context and reader should be considered in translating idioms since idioms are more conceptual, and

it is the ideology and the cognitive mechanism that motivates the occurrence of particular words or phrases. In this sense, those factors would also influence the translator's choice to render the allusions (Fan, 2007). To be more specific, it can be found that the English translator makes the version easy to understand through detailed explanation but sometimes misinterprets the culture-specific allusion.

On the one hand, the English translator is in the same position as the target reader when rendering the allusions. In other words, they are, as a foreign reader of the ST, in the same cognitive environment. It would be presupposed that the English translator would interpret similarly to the target reader, making their version accessible to the actual readers. On the other hand, as the foreign reader of the ST, the English translator cannot comprehend Chinese culture as easily as a native translator and may activate negative transfers of language and culture. When people's native cultural knowledge contradicts the foreign one, they may consciously or unconsciously interpret the foreign one with the aid of their cultural norms, causing misinterpretation and mistranslation. While for the Chinese translator, their cultural background may give them more accessibility to the ST and culture; but at the same time, alienates them to reach the target reader. Unlike the English translator, the Chinese translators tend to retain the original meaning of the ST works for their purpose of translation, aiming to introduce the Chinese culture to the outside world. The ideologies behind the two translators make one be more reader-oriented, while the other is more author-centred. Therefore, this interpretation of the result reflects the theory of directionality in translation studies since the translators are translating in and out of the mother tongue, respectively.

Similar findings are available in another comparative study on the translation of Chinese literature (Zhu, 2017). Through comparing four different translations of the same ST, two from Chinese translators and two from English translators, on certain cultural-specific words and allusions, Zhu (2017) concludes that translators recognised these cultural signals but adopted different strategies based on their understanding of the materials and different translation purposes (Zhu, 2017). Although the author did not note the difference between translation directions, it can be found that the translators doing the same translation direction have some similarities in translation preferences and patterns. For instance, the translators doing the L1 translation tend to provide similar notes explaining its origin, while the translators doing L2 translation choose not to provide any notes. Whether the preference of translators' choices in the process of translating allusion would be influenced by the direction of translation is one of the aspects that I am curious about. To be more specific, both researchers comparatively analysed different translation versions of ST, respectively.

However, they did not categorise those translation solutions into any existing models of translation strategies to deal with allusions or cultural references. Thus, the relationship between the directionality and the preference with translation strategies is needed to be investigated in this thesis.

2.3 Summary: Directionality in the Translation of allusions

Greater awareness of the directionality in translation studies and the significance of L2 translation have been a trend in the recent decade, especially when English has been involved in the translation and under the context of English as Lingua Franca. Discussions and findings related to these issues were reviewed above, and researchers theoretically, practically, and empirically considered the significance of L2 translation in translation studies. Theoretically, although the L1 translator has a better command of the TT production, they often have difficulty comprehending the ST (L. Beeby, 1998; Grosman, 2000). Meanwhile, in the context of English as Lingua Franca, the translation norms have changed, and the L2 translators might be as good or even better to deal with this kind of translation (Kovacic, 2000; McAlester, 1992). Practically, the limited availability of L1 translators (S. Campbell, 1998) and its failure to match the great need for promoting less-dominant language into the major world (N. Pavlovic, 2010) stimulated the growth of L2 translation. Furthermore, empirically, it is still an ongoing discussion about CE allocated in L1 and L2 translation; the results differ across languages and levels of translators.

The studies reviewed above also lead to new avenues that deserve to be explored, such as the translation of culture-specific allusions. As L. Beeby (1998) and Grosman (2000) pointed out, the comprehension of ST is always being undervalued, and it has been taken for granted that the L1 translators can always be competent in understanding the ST and SC. However, in the translation of culture-specific reference, like allusion, L1 translators might have difficulties understanding or even recognising the item since allusion is embedded with complex intertextual relationship, linking to not only the ST which contains the allusion also the former text where the allusion came from. Thus, allusion is overwhelming culture-specific and hard to be understood by outsiders of its source culture, especially Chinese allusions that mostly come from ancient Chinese. Here, the merit of L2 translation is revealed.

In the context of this thesis, these previous studies have inspired, for instance, 1) the investigation of the opinions towards directionality and translation of allusion among future translators to reflect those issues in translation training and practice in English and Chinese translation; and 2) having the

allusion in the ST, the allocation of cognitive effort in both directions of the translation process to find out which direction is more demanding and which part of translation procedure (ST or TT) is more difficult in each direction, respectively; 3) whether the allusion is confirmed to be more difficult to comprehend than the non-allusive phrases. Furthermore, having Leppihalme's (1997) model as the framework for strategies to translate allusions and inspired by N. Pavlovic (2007a), who examines directionality from the perspective of problem-solving, this thesis also explores the potential impact of directionality on the choice of translation strategies for allusions, and the factors have influenced the decision-making. To the author's knowledge, this thesis constitutes the first research to comprehensively investigate the translation of allusion between English and Chinese from both objective and subjective perspectives. The next chapter will introduce further details on the specific research questions, the methodology of research design, and the steps to operate the experiment.

Chapter 3 Methodology and Research Design

This chapter presents the methodology and research plan of the thesis, aiming to outline and discuss the adopted research methods, research procedures and the instruments used for data collection and analysis. Based on the research questions to be answered, Section 3.1 begins with the model proposed by Grix (2002) to illustrate the interrelationship between the key components in research methodology, followed by a discussion of different applied methodology, comparing the pros and cons of each method and demonstrating how those research methods could respond to the research questions. Then Section 3.1.2 outlines the research plan of the thesis by three sequential phases of the experiment, which contain the piloting of the original plan, the amendments based on the pilot results and the modified research plan. Section 3.1.3 poses the criterion and procedure for selecting the allusion and the ST. Section 3.1.4 introduces the criterion for recruiting participants and stresses ethical considerations as part of the process. Finally, Section 3.2 presents the preparation of the data collection procedure, the instrument for data collection and analysis, including quantitative statistical analysis and qualitative coding methods.

3.1 Research Design: A Mixed-method Approach

The design of this research was informed by the nature and worldview of the research itself and is structured based on the Grix (2002, p. 180) model, illustrated by "the interrelationship between the building blocks of research".

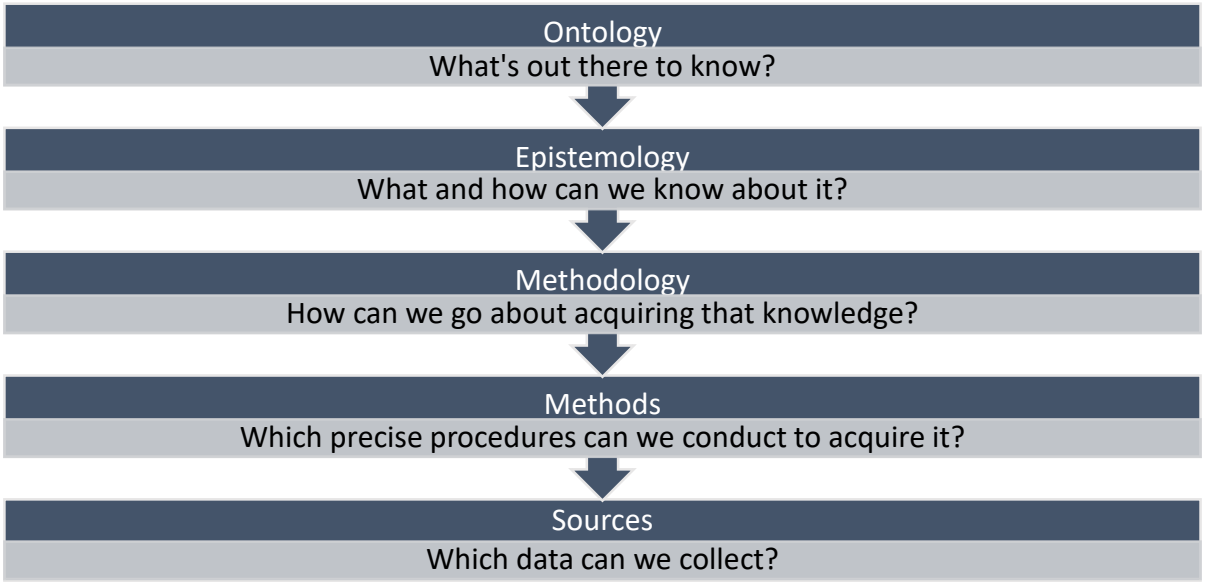

Figure 2 Grix's model on the interrelationship between the building blocks of research

Admitting this figure to be a relatively rigid, prescriptive and old-style, Grix (2002), however, indicated that it does provide a novice-friendly view to help understand how the key components of the

research link together, from research ideas (ontological position) to those which are gradually generated into a research plan (methodological approach). He gives a clear direction of how research should progress and believes that the research design is a linear routine that should start from the very beginning, the hypothesis, rather than having the whole design led by one favoured research method. He also noted that the directional relationship between each component does not mean that the former could determine the type of the latter; for instance, the factors that guide the choice of research methods are the research questions, instead of ontological or epistemological assumptions. Based on Grix's model and the questions he raised to guide research design, the building block figure of this research is shown below:

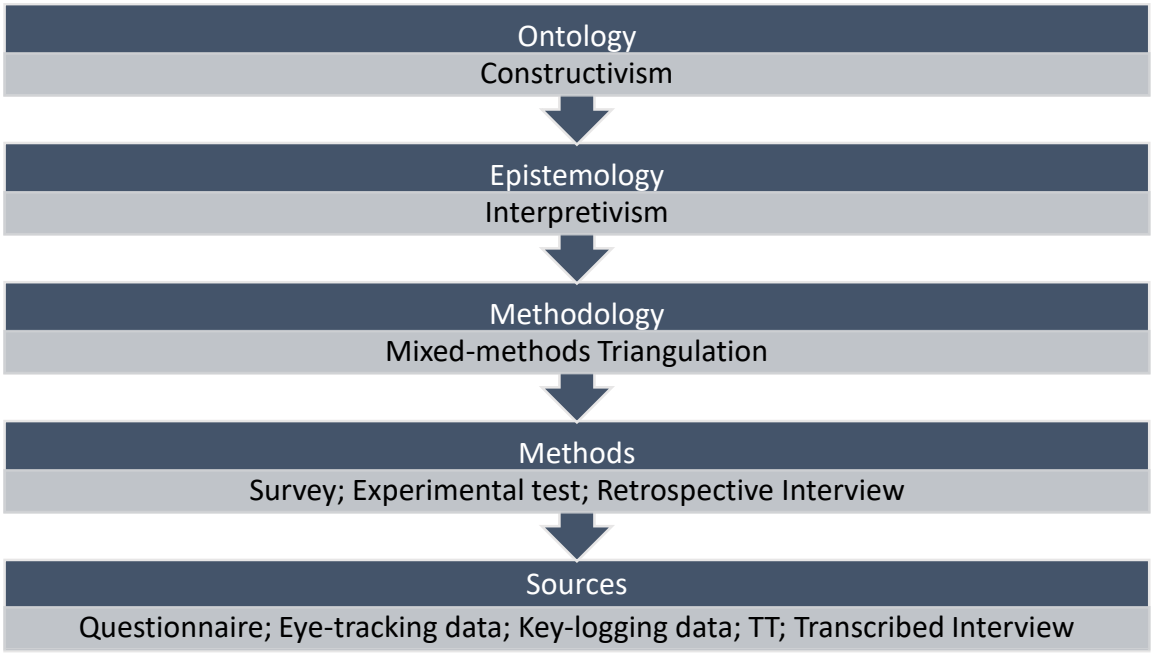

Figure 3 The interrelationship between the building blocks in this thesis

3.1.1 Research Methodology: Triangulation

This thesis demonstrates a subjective worldview for both the Ontological and Epistemological positions, which describe how we come to know what we know. Starting from the point of view that research of translation originates from Social Science and is constantly influenced by the outside world and social changes, this research adopts a Constructivist Ontological position and an Interpretivist Epistemological position. It puts forth the view that the phenomena observed in translation studies are being constructed, negotiated and revised through interactions among translators, the original writers, the researcher and readers. Starting from what to know (the Ontological position) and graduating to what can be known (the Epistemological position), the next

stage in the research design process is to consider the methodological approach. To illustrate the suitability of the mixed-method research methodology for this research, the following section provides brief explanations of Qualitative, Quantitative and Mixed-method approaches, explaining both the strength and weaknesses of each method and discussing the application of triangulation in this research.

Quantitative research mainly adopts statistical analysis, from the basic average calculation to the more complicated significance of the T-test or factorial analysis, dealing with a large amount of data. However, although of benefit for research in producing generalised results, quantitative analysis lack in-depth analysis; for instance, the underlying motive and reason to explain the participants' performances or deeds is not easily ascertained through quantitative research alone. On the other hand, qualitative methods could provide such causes and motives to explain the examined situation using an open-minded research design (Dornyei, 2007). It tends to be less dependent on large statistical data but more on the researcher's experience than the quantitative one. Therefore, it is potentially risky that theories concluded from small numbers of cases are too specific to generalise, causing over-reading of the individual data. In this case, the quality of the results in Qualitative research would largely be determined by the competence of the researcher analysing the data (Dornyei, 2007).

To take advantages of both methods and offset their weaknesses, mixed-methods research attempts to integrate the two approaches at one or more stages of the research process (Dornyei, 2007). It might be appropriate for complex issues that require multi-level analysis with data representing both individuals and a broader context. For example, a Quantitative survey collecting information from a relatively large number of samples at the beginning of the research brings out a broad context and rich foundation for the researchers to develop a Qualitative observation. In addition, the qualitative interview, with in-depth and detailed insight, could further explain the data in the Quantitative survey. It is believed that the research outcomes confirmed by combined Qualitative and Quantitative data are more likely to achieve higher credibility than those concluded from a single method (Erzberger & Kelle, 2003).

Adopting a mixed-methods approach is appropriate to this thesis's research questions, which require measuring factual information from the Quantitative research and in-depth analysis that cannot be accessed through statistics. To answer the RQ1, only Quantitative methods will be applied since all sub-questions are related to cognitive efforts, which are presented through numerical data generated from the eye-tracking and key-logging techniques during the experimental translation test. The

introduction of the quality assessment model in this chapter helps explain the cognitive data further. The RQ2 focuses on the translation strategies translators adopted during the process and factors that influence their decision-making, reflecting from both their verbal report and their final TT. Therefore, the Qualitative text analysis from the transcribed retrospective interview and the translated TT would help categorise the strategies and the participants' motives for resorting to these strategies. The following section will explain how the Mixed-method approach benefits this research alongside the actual methods and detailed experiments.

3.1.2 Research Methods: Three phases

In order to have a relatively systematic terminology of research design, Johnson and Christensen (2004), as cited in Dornyei (2007, p. 169), proposed a simple symbolic system to represent the organisation in this field: "QUAN" or "QUAL" indicates either the Quantitative or Qualitative methods as being the primary data collection method in a particular phase, while the "quan" or "qual" is the supplements. The research consists of three phases, with triangulation occurring throughout the research process. The structure of this research in each phase is shown below:

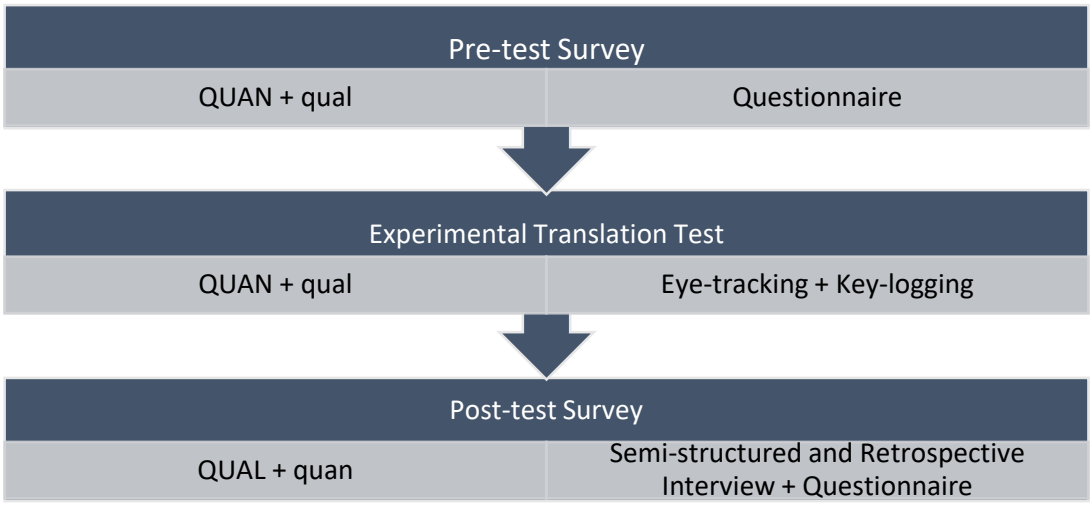

Figure 4 Three-phase research design

In Phase 1, 122 participants were invited to complete a survey mainly composed of closed-ended questions. The survey consisted of questions concerning their academic language background, language usage and translation training in daily life, and attitudes on the directionality issue.

In Phase 2, participants in Phase 1 who met specific criteria were recruited to participate in an experimental translation test. Eye-tracking and key-logging were used to monitor and record the processes used by the participants to produce their translation product (TT). The selection of

participants and the translation ST will be further introduced in Sections 3.1.3 and 3.1.4. The eye-movement and key-logging data are collected quantitatively as they are the numerical data of the eye fixation duration and counts and the time stamp of critical activities.

Phase 3 is a mixture of cue-based retrospective and a short questionnaire. After finishing the eye-tracking experiment, the participants were asked to complete a questionnaire about allusion translation. Then following a semi-structured interview about their experiences in the test, they were asked to review their translation process while looking at a screen-recording of their translation performance to explain their reason or motive in adopting specific translation strategies for the allusions.

The combination of varied pragmatic research methods was expected to produce a result that would help to answer the complex research questions already posed. For an object of study as complex as translation, triangulation occurs at the level of research design and data collection methods. For instance, conducting the interviews after the experimental translation test will improve the depth of the study by inquiring into the participants' individual opinions and meanings behind the quantitative data, enhancing the study's internal validity (Dornyei, 2007).

3.1.2.1 Source of data: Pre-test Survey

As a data collection method in pre-test surveys, the questionnaire is one of the most common methods used by researchers to interact with translators and readers in translation studies (Chen, 2018). Because of the systematic and disciplined manner in which it can be conducted, a questionnaire survey is generally always allocated in the first research stage.

The questionnaire methods were adopted in both the first and third phases of this research plan which is structured in two separate parts, related to the two main focuses of this thesis, directionality and allusions, by exploring student translators' understanding and personal experiences about these concepts. A Likert scale was employed in most of the questions because of its reputed advantages: ease of construction and comprehension and being straightforward and suitable for measuring the intensity of participants' attitudes (Garrett, Coupland, & Williams, 2003). Several questions were designed as rank order items: participants were asked to rank items or statements from a shortlist according to their preferences.

A pilot study was carried out five months before the formal research took place to pre-run all the procedures to test the accessibility of the survey design and detect faults or inappropriate questions.

It was conducted in the same university among 30 postgraduates from an English translation course. Based on the feedback from the pilot study, the questionnaires were finally conducted in Chinese to make sure that all of the participants were entirely able to understand and answer the questions. Most of the questions in the pilot study were kept, while some were modified into a concise and more precise way of wording. Additional aspects included more queries into the participants' studying and working experience and understanding the languages and the related culture.

The final questionnaire of the first phase was structured in two parts: a) the questions that interrogate the participants' background information, and b) the participants' understanding and overview of translation direction and the relationship with the source and target context. Although this part did not answer any of the research questions, the background information about participants' language, translation competence and self-evaluation was expected to explain some of the decision-making in the translation process.

The first phase aimed to investigate the attitudes and opinions of 122 student translators to the issue of directionality in translation, how much they acknowledge those concepts and their language and cultural background, and the translating experiences of those participants. All the participants were current students in a university in China; more than three-quarters were postgraduates majoring in English translation, while the others were undergraduates in an English translation major. For further details of participant selection criteria, see Section 3.1.4.

3.1.2.2 Source of data: Experimental Translation Test

Empirical-experimental research is a growing interest in the translation field. Triangulation is also emphasised in empirical, experimental research, using various analytical methods to interpret the process of translation from different complementary points of view. TAPs (Think Aloud Protocols) have been seen as the primary data elicitation tools of empirical-experimental translation research over the years, being used as the first attempt to gather data during the translation process, especially focusing on the cognition of translators when doing translation tasks. However, as time goes on and new techniques have developed, TAPs have proved to be problematic, in that participants are unable to do two tasks simultaneously (translation and verbalisation) automatically, and the TAPs might interfere with the flow of text production. With the spread of computer usage in research design, the Translog software was developed to observe the flow of text production online, recording key-press per moment during the translation process. A Supervisor and a User software

complement each other to design the experimental projects, replay the logged information and generate XML or CSV files for statistical analysis in the following steps.

Based on the feedback from the pilot study, a formal experimental test was conducted using a combination of eye-tracking and key-logging technology. Compared to the pilot study, several modifications have been made to ensure the credibility and validity of the data source. A significant change is the introduction of eye-tracking technology to explore the cognitive efforts during the translation process. Empirical studies using eye-tracking equipment to measure the cognitive effort of the translators has been reviewed in Section 2.1. as well as other critical research in this field.

Cognitive Effort

In the field of Cognitive Psychology, the definition of cognitive effort was recognised as "the amount of the available processing capacity of the limited-capacity central processor utilised in performing an information-processing task" (Tyler, 1979, p. 68). In some cases, the notion of cognitive effort is often used interchangeably with cognitive load (Sjørup, 2013). To avoid potential misunderstanding or possible confusion with other words, the cognitive effort will be the only term in this thesis to describe an individual's capability of performing a cognitive task. In translation studies, it can be more seen explicitly as the cognitive resources a translator allocates to the translation task to match the cognitive demand from the task itself. Factors that are likely to influence personal cognitive efforts were considered as part of the research design: light and noise conditions, time pressure, readability of the text and expertise of the participants.

Cognitive effort is measured mainly by time, pause, segmentation, and, more recently, eye-movement tracking. Two assumptions from Cognitive Psychology provide theoretical support to these methods: the immediacy and the eye-mind assumptions (M. A. Just & P. A. Carpenter, 1980). The former assumed the interpretation of a text at all levels of processing happened as soon as possible, while the latter articulates no appreciable lag between eye fixing and mind processing. Following the two theories, the principle of the eye-tracking technique can be interpreted as the user's physical activity in reading, shown as the fixation of the eyes at specific time stamps, and reflect the mental processing of the text without processing deferral. The eye-tracker captures the activities of the user's eyes and, from which it can be inferred, show which text the mind was processing.

Piloting Stage

The piloting of the second phase adopted the key-logging method, using Translog to look into the pause as the indicator of cognitive efforts of participants when translating from and into their L1, dealing with the translation of allusion as the cultural reference. Seven participants were recruited in this pilot study. They were first-year postgraduate students in a college in China, majoring in English translation. The experiment took place in the classroom with computers installed with Translog software to log the key-stroke activities during the translation process and screen-recording software to record the translators' activities besides the key-stroke, e.g. external resources searching. The interface is shown in Figure 5: the key-logging software Translog is fixed in the left part of the screen, while the other half is set up to access external resources. The screen-recording software runs in the background without any interruption in the translation process. As for the Translog software, the upper part tends to be the interface for the ST, while the lower part is designed to produce the TT. With the help of the Translog supervisor tool, the researcher can programme the interface shown to the participants. The background colour is grey to distinguish the software from the external support browser and avoid bright light irritation to the eyes after a long time translating.

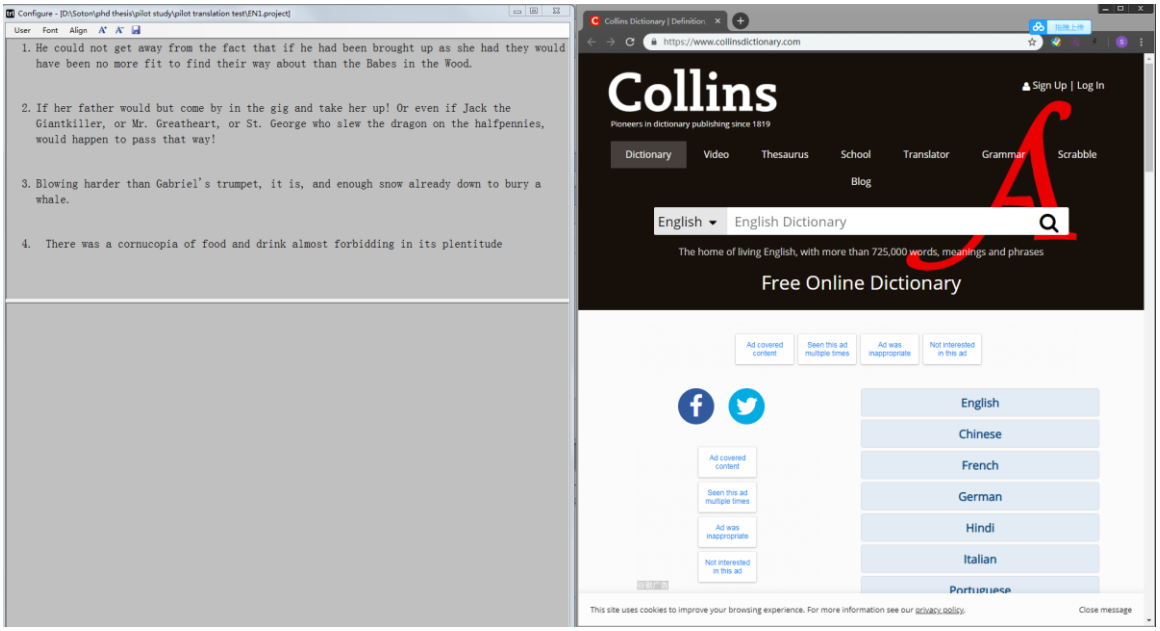

Figure 5 Translog interface in the Pilot study

Participants were assigned four test sections to translate in the translation test, two into Chinese (CH1, CH2), two into English (EN1, EN2), and each section should be finished within 20 minutes. Doing a translation task in a test environment with a time limit enables the participants to devote all their attention to it due to the time pressure. Each section consisted of four sentences randomly chosen

from the literature works corpus based on specific criteria: a) it contains an allusion, and b) the overall word count of texts in each section should be about the same.

The application of Skopos theory can be seen from the research design. In translation studies, the skopos theory holds that the formation of the final TT is determined by the function or skopos. Vermeer (1990) introduced the notion of Skopos into translation studies, meaning purpose in Greek, demonstrating the significance of TC expectation, norms, conventions, and requirements to the translator when producing the TT. He further added that in skopos theory, the translators actively choose diverse approaches and strategies to render the texts when responding to different reading expectations and requirements (Vermeer, 2000). Hatim (2009) proposed a framework of potential factors that governed the translators' decisions and indicated that the audience design, the translation purpose and the text receiver information significantly determined the translators' decision-making.

For this reason, this pilot experimental translation task was guided by two different skopoi. Every translation ST was coded before the experiment according to their direction, L1 translation as EN and L2 translation as CH. Besides, according to the Skopoi, some pieces were coded 1 (CH1, EN1) in which participants were notified that they were translating for native speakers of the TL, while those coded 2 (CH2, EN2) were targeted to the native speakers of the SL who learn the TL as a foreign language. The rationale of having two different Skopoi for the pilot study is that the prospective reading group of the translation work are supposed to be either the native speakers of the TL or native speakers of the SL. In responding to different reader groups (purposes), it is worth investigating whether the translators' performances vary according to Skopos theory and whether the directionality issue and translating allusions affect the application of the theory in the translation process. In terms of external resources, participants were not allowed to use machine translation software; instead, they were advised to use online dictionaries or search for references for allusions online to ensure that the human translators dominate the translation process rather than the machine.

Key-logging data has been used in translation process research to primarily investigate cognitive processing (M. Carl & Kay, 2011; Jakobsen, 2016; Lacruz, Shreve, & Angelone, 2012; O'Brien, 2006). Key-logging of writing processes in translation was seen as a complementary method of exploring cognitive processing during translation to make up for the shortcomings of qualitative methods such as the TAPs. Compared to the TAPs, key-logging has the main advantage in that it is almost invisible to the translators in the whole translation process. All key-stroke activities were logged without

interfering with the translation process, making almost no difference to the translators' natural working environment.

However, the inherent weakness of the key-logging methodology is that researchers have no access to the activities outside the logging surface solely from the key-stroke analysis. For instance, it is hard to distinguish whether a translator is reading the text on the screen or thinking about what to write next through Pause analysis. The increasingly widespread use of eye-tracking techniques could compensate for this gap by catching the translator's visual sight during the working process and offering detail about the translator's cognitive attention through pupil gazing data, including gazing time, gaze point and pupil diameter. Although there has been innovation in the eye-tracker to make it portable and easy to operate, the relatively higher cost for the machine has limited it from being widely adopted in translation research. For those reasons, the pilot study adopted key-logging as the main data collection method, trying to create an actual translation test environment for the participants, while for the formal experiment, the eye-tracking technology is still the better option to collect the cognitive data based on the feedback of the pilot study.

The feedback from the pilot study was quite inspiring and valuable for modifying the technical problems raised during the experimental translation process. A vital point is the length of ST shown in the interface of key-logging. In the translation test, the participants were asked to translate sentences that contained allusions, while some of them pointed out that it would be better if the allusive sentences were shown within a paragraph to clarify the context of the sentences. Another issue is about the indicator to signify participants' attention from one sentence to another. In the pilot study, all four sentences in one section were listed on one interface. To decide whether the participants have moved on to the next sentence or have gone back to a previous sentence, the researcher needs to find the enter key between the sentences or the movement of the text cursor. However, the timing of the key pressed is not precise enough. The last issue is time management; the participants took more time in the translation test than expected, which took up the total time on the retrospective interview section, which was due to take place immediately after the test. Compared to the semi-structured interview, a lengthy retrospective interview would be complementary in explaining some activities that can be recorded from neither key-logging nor screen-recording software (Schäffner & Shuttleworth, 2013). The maximum length of the translation experiment was 2 hours, as it was impossible to exceed this time due to practical reasons and consideration for the participants' fatigue limit. However, since the translation experiment test required more time than expected, the researcher would have insufficient time to conduct a retrospective interview to review the whole

translation process on each participant. Therefore, to obtain relatively in-depth and convincing data within the 2 hours experimental test, the eye-tracking technique used to collect the participants' gaze data during the translation process was eventually introduced in the formal study, together with a cue-based retrospective interview. These replaced the full-length retrospective interview.

From the feedback of all of the pilot study participants, key-logging and screen-recording have almost no influence on their translation process, which means that even with these methods working on recording their activities, there would be no extra cognitive burden on the participants themselves to affect the results of the experiment process. The concern arose as to how to ensure the "invisibility" of the eye-tracker during the translation test and how to eliminate the influence of the device on the participants as much as possible. As mentioned before, most of the eye-trackers in the lab are not suitable for a translation process investigation since they are mostly head-mounted equipment that limits the movement of the participants. Thus, the experiment would introduce a non-intrusive to tackle the three issues raised from the pilot study. Firstly, context could help participants in understanding the ST, according to the feedback from pilot participants. By capturing the eye data during reading the contexts and translating the sentences, the eye-tracker could provide more information about cognitive efforts between reading and translating into and from the first language, which is expected to support or inspire the research findings. Then, as implied by its name, the eye-tracker could record all the pupil activities on screen and from the gazing points of the participants, it can tell where the translator's attention is located; therefore, the signal to indicate the position of the translator's attention will be unnecessary. Last but not least, by adopting eye-tracking, the indication of attention and cognitive loading at every moment during the translation process, together with the cue-based retrospective interview, could replace the retrospective interview for the whole process, dramatically to shorten the overall time length of the experiment.

The Eye-tracker and the Set-up

The eye tracker should accurately capture gaze behaviour, bear slight movements and be nearly invisible to the participants' translation process. A Tobii Pro X3-120 was finally chosen after negotiations with Tobii China company, which loaned both the hardware and software for the entire duration of data collection in China. In exchange, the name of the company and the device would be mentioned in all future presentations or publications related to this doctoral research. The X3-120 is a remote tracker that is well suited for empirical translation research as it is an unobtrusive eye-tracker that would not disturb the participants doing the experimental test. At the same time, it captures the

participants' gaze behaviour and pupil activities for researchers to make assumptions about the cognitive movement during the translation process. The X3–120, measuring only 324 mm in length and only 118 grams in weight, was attached under the screen of the researcher's laptop. The tracker collects gaze samples at a rate of 120Hz, looks for participants' eyes, generates a raw gaze data point at approximately every 8.3 milliseconds, and recovers the tracking within 100ms after missing the eye-sight of the participants (Tobii, 2015). Participants are allowed to move within the "head movement box" (50cm x 40cm x 40cm), 50cm from the screen that the tracker is attached to, which is large enough to accommodate reasonable movement during the translation process. The gaze accuracy and precision of X3-120 that determined the validity of collected data can be seen in the Table below:

Gaze accuracy[1]	Tobii Pro X3-120 Eye Tracker (firmware version — 1.7.1)	
	Binocular	Monocular
At ideal conditions	0.4	0.5
At 25° gaze angle	0.6	0.7
At 30° gaze angle	0.6	0.8
At 1 lux	1.0	1.6
At 300 lux	0.4	0.5
At 600 lux	0.5	0.6
At 1000 lux	0.5	0.7
White stimuli background	0.7	0.9

Gaze precision at ideal conditions	Tobii Pro X3-120[1]	
	Binocular	Monocular
Human Eye	0.24	0.34

Table 1 Eye-tracker accuracy and precision table

The device comes with associated Tobii Pro Studio software that assists in running the experiment and analysing the eye data collected by the eye-tracker. Once the software is open, a timeline represents a blank test that regulates the order in which stimuli are presented. Stimuli can be dragged to the timeline one after another, and the test will proceed according to the order. For this experimental translation test, two kinds of stimuli elements are applied: instruction and screen recording. As implied by the name, the instruction is a text displayed before the screen-recording stimuli to give the information to the participants. It is designed to be the translation brief that gives the Skopos of the TT, an outline of the translation purpose, and information regarding the prospective TT readers. Compared to the instruction, the screen-recording stimuli is more complicated to set up. The Translog, which collects the key-log data, and the Tobii Pro Studio, which collects the eye data, are embedded. Once the screen-recording element is stimulated, it will automatically open the Translog, and the Tobii Pro Studio software will run in the background. The operating laptop presents a regular screen, enabling the participants to open any external resources

they need for the translation test. Therefore, as long as the Studio software is running, it uses whatever is present on the participant's screen as the stimulus and generates a software-based video recording of the contents on the operating monitors and the simultaneous gazing behaviour of the participants on screen.

Eye activity: Fixation

The eye activities are represented by two eye-movement behaviours: fixations and saccades. The eye tends to slightly scan (low resolution) the stimulus area before focusing on a specific element within it (Duchowski, 2007). The area of stimulus around the focus point, in low resolution, is named the parafoveal area, while the focusing, in high resolution, is the target of attention in a timestamp, named the foveal area. Fixations refer to the “eye movements that stabilise the retina over a stationary object of interest” (Duchowski, 2007, p. 46). Once the eyes gaze at one point, the area gazed on is in foveal vision, while the area around it is the parafoveal area. The fixation duration (time length) and the count (number of fixation) are two metrics that could represent the amount of cognitive effort - an increase in duration or count indicate a relative increase in cognitive effort devoted in this area of stimulus (O'Brien, 2011).

The Experiment Procedure

The experimental translation test took place in a secured room used exclusively for eye-tracking experiments at the Beijing International Studies University. The room had a 2x2 square meters window and was fully covered by dark brown heavy curtains to block any extra lighting outside. With only three ceiling lights on and being quite high above the participants, the light source was kept constant and evenly distributed without strong and direct light affecting the participants' eyes during the experiment. A warning sign was stuck on the wall outside the room to avoid any accidental entry, and a chair was prepared for the next participant who arrived early. Due to the availability of only one eye tracker, only one participant was arranged at a time. The time slot between each participant was set to 2 hours, based on conclusions from the pilot study; only one participant exceeded the time limit.

After sitting down in front of the equipment and before going into the first section, the participants needed to enter their personal information: their gender and academic level between Undergraduates and Postgraduates. Then in the calibration section, the participants are required to move their heads and upper bodies under the guidance of the researcher based on the indication

scale of the Tobii software (see Figure 6 below). The white spots on the black background indicate the participants' eye movement, and the small cursor in the right colour column shows the distance between the eye and the tracker. The participants were required to adjust their position and be aware of the range of movement based on the scale. Then the participants were asked to look at a moving cursor on the screen to check the precision of the gaze-based on five fixed points; four in each corner of the screen and one in the centre. The experiment can proceed to the experimental section when the five-point calibration test is shown below, with all points shown green and all green lines gathered around the points.

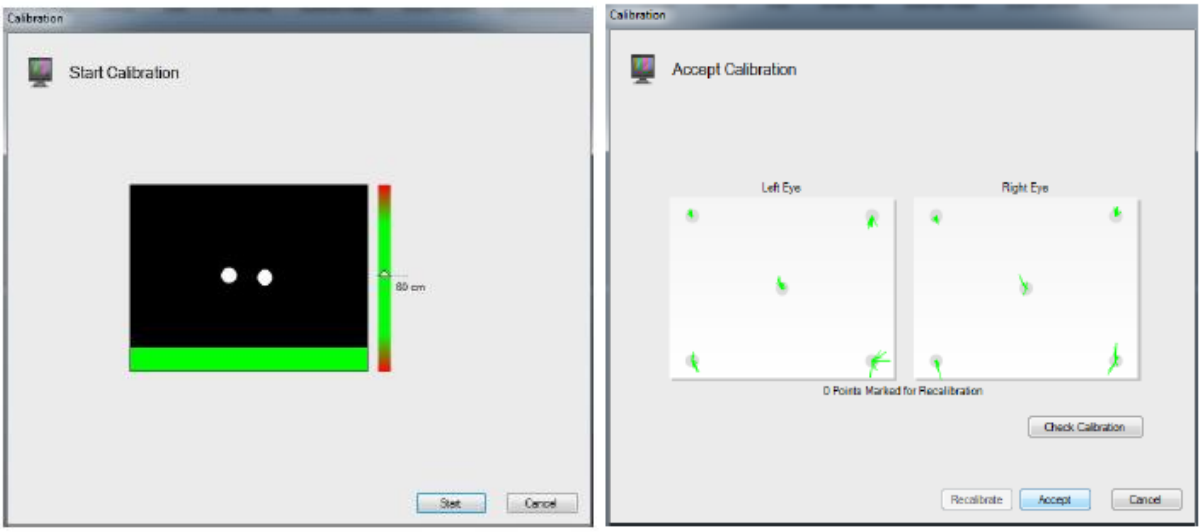

Figure 6 Eye-tracker calibration

The design of the eye-tracking experiment is shown in Figure 7. The first section was a typing test that helped the participants familiarise themselves with the interface of both Studio software and the Translog and tested the participants' typing speed. Considering their individual differences, the typing test was set up to calculate their typing speed in English and Chinese, respectively, and the individual speed median was considered for a reasonable pause threshold that is adequate for most participants in the Pause analysis process; the participants with exceptionally fast or slow typing speed will be given more attention in the analysis process—for this reason, having individual typing speed in both their L1 and L2 before the translation test is crucial for the Pause analysis. Especially when discussing the pause that represents cognitive efforts in two directions of translation, having two different pause thresholds that come from typing speeds in two languages could potentially eliminate the possible influence from various typing speeds on defining the qualified length in Pause analysis. For the typing test, the sub-software Translog Supervisor allows the researcher to design the interface and the text shown to the participant as the typing test introduces some key points of using the eye-tracker during the translation process. Participants are asked to read the lines first and then type the

sentences in the TT column. After typing, they will need to press the stop-logging button, and the record will be saved as a separate XML document. From the first section, the participants can familiarise themselves with the operation and interface of the Translog and can raise any questions before going into the next section.

According to the translation direction, the following sections can be seen as two groups: English to Chinese (E-C) and Chinese to English (C-E) translation. The order of the two directions will be randomly adjusted to ensure equal opportunity for either direction to present first. As indicated by Buchweitz and Alves (2006), task order could be an influential factor on the translator's cognition and behaviour, probably due to the level of fatigue of the participants at the end of the experiment.

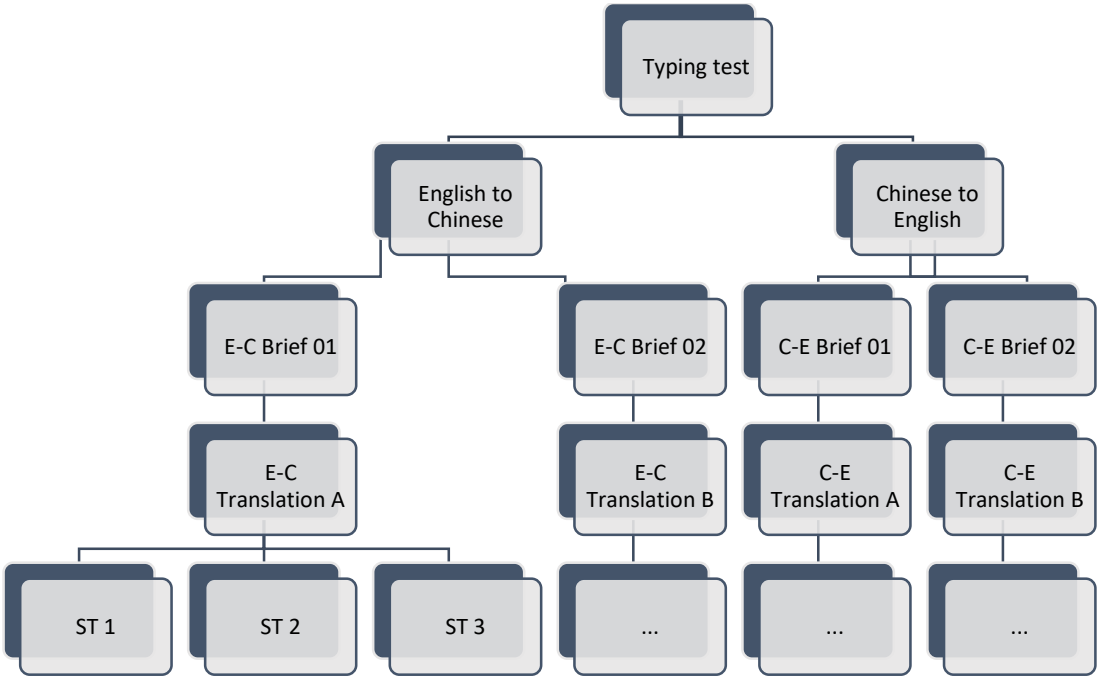

Figure 7 Translation test procedures design

As shown in the above Figure 7, there are four sub-sections within each direction group. Similar to the pilot study, Brief 01 and 02 gives information about the Skopoi and target readers. Since different translation briefs may call for different levels of cultural knowledge (Olk, 2001), dealing with literary texts for educational purposes may have different considerations from translating the same text for leisure reading (for detailed criteria of text selection, see Section 3.1.3). Therefore, the formal experiment provided more instruction to the participants to have a clear Skopos when translating. For the brief coded 01, the translation is expected to be of literary works for general leisure reading, and the target readers are native speakers of the TL who have little knowledge about the source language

and culture. While for the brief coded 02, the translation is expected to be learning materials for culture extension, and the prospective readers can understand the TL and are willing to learn about the SC through the TL. The instruction in brief 01 and 02 for both translation directions shown to the translators is set out below:

E-C Brief 01	E-C Brief 02
1. This translation is expected to be literary work for leisure reading 2. The readers are expected to be Chinese native speakers, having little knowledge about English culture.	1. This translation is expected to be learning material for culture extension. 2. The readers are expected to understand the Chinese language, if not expertly, and are willing to learn about authentic English culture.
C-E Brief 01	C-E Brief 02
1. This translation is expected to be literary work for leisure reading 2. The readers are expected to be English native speakers, having little knowledge about Chinese culture	1. This translation is expected to be learning material for culture extension. 2. The readers are expected to be those who can understand the English language, if not expertly, and are willing to learn about authentic Chinese culture.

Table 2 Skopoi in the Translation brief

The rationale of having different briefs is that the chosen cultural and literary texts that contain allusions are mainly published as literary works for the ordinary reader in the TC (Brief 01), while some are edited into textbooks to learn about the culture (Brief 02). Furthermore, it expanded the range of the prospective reader group to reflect the phenomenon of English as the Lingua Franca nowadays. With one group being the native speaker of the TL as in the pilot study, the other group includes all the non-native speakers of the TT. This specific group of readers can understand the TL and are willing to learn more about the SC through the TL. In C-E Brief 02, the prospective readers are not English natives but are willing to learn about Chinese culture through English, which is a language that is more familiar to them. To contrast, the E-C 02 brief proposes the situation where the prospective readers are not Chinese natives but learning about English culture through Chinese, although being relatively rare; the setting of the prospective readership is designed to examine how the participants would respond in cognitive level, as well as in another presentation perspective.

As shown in the above Figure 6, 6 STs in each direction have been divided into two groups (Translation A or B), with three STs each, following one Skopos (Brief 01 or 02). The time limit for each translation group, A or B, is 20 minutes; for it proved to be a reasonable time similar to the workload in the pilot study, all the participants could finish all the tasks. Furthermore, another requirement was asking them to finish each section in time as little as possible to ensure that they have similar pressure on the time constraint. Through the post-test interview in the pilot study, most of the

participants reported that they experienced time pressure, but it was not very severe to lead to careless translations. Having adequate time limits during the translation serves the aim of cognitive exploration. Jensen (2000), as cited in Hvelplund (2011), believed that the allocation of cognitive resources in translation was sensitive to time pressure, and a slight non-significant effect of fixation duration in the source area was found by Sharmin, Spakov, Raiha, and Jakobsen (2008) under time pressure. It could, therefore, be anticipated that with slight time pressure, the differences between L1 and L2 translation in terms of the cognitive allocation and translation performances could be more significant, reflected from eye data and researcher observation.

Each ST is a short paragraph from a literature work, with only one sentence containing one allusion underlined. In the typing test section, the participants were notified that only the underlined sentences needed to be translated. The reasons for this particular instruction are that firstly it is preferred to have various kinds of allusion as many as possible in every single sentence; secondly, according to the feedback in the pilot study, the participants need more context to understand the sentences for translating the allusions well.

The presenting order of the three texts within the translation section was randomly chosen to avoid the influence of task order on the translation process. For the same reason, the order of translation direction, E-C or C-E, was reversed for half of the experiments, as well as the order of translation briefs 01 and 02. Furthermore, the combination of translation briefs and translation A/B group is not fixed either. For half of the experiments, the translation group A was presented after the brief 01 so that the participants would translate the three texts in Group A based on the information given in brief 01. While for the other half, it was translation Group B guided by brief 01's instruction. The researcher manipulated all the orders manually, setting a schedule to arrange the orders before the experiment began.

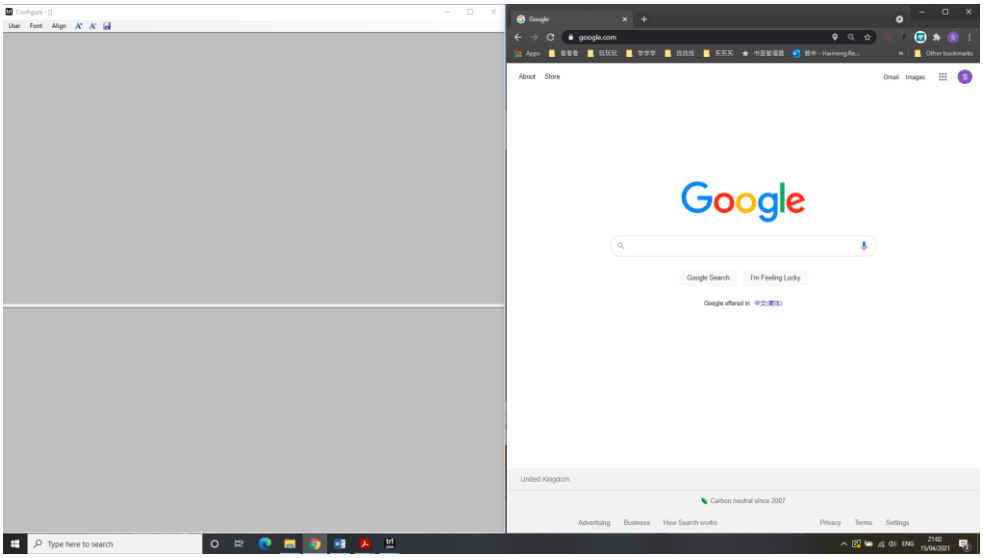

Figure 8 Interface in the formal test

Figure 8 presents the interface of the translation test. The Tobii software had no interference on the screen: the upper left part is the ST area, and the lower left is the TT area. All of the windows on the screen are fixed and not allowed to move or adjust, and the stabilised windows benefit the researcher to divide the areas of interest (AOIs) for the following data analysis. The participants are allowed to use external resources during their translation process. They had access to all possible browsers except for the machine translation software or translation engines supported by machine translation.

3.1.2.3 Source of Data: Post-test Survey and Interview

After the experimental test, participants were given a short questionnaire about their experience in the translation of allusion. The rationale of putting the allusion survey after the experimental test was to avoid anticipation by the participants before taking the test to make sure that the experimental test would proceed as naturally as possible. This questionnaire also adopted mainly a Likert scale form, with two ranking questions, for the participants to answer questions about a) their experience in translation of allusion before and during the present experimental test and b) the experience of receiving training on the translation of allusions and whether they have learned about strategies to deal with the allusions.

Following the questionnaire, a cue-based retrospective interview in Chinese was conducted where participants were asked to review their translation process, focusing on the allusion in the text and the strategies they resorted to. The screen-recording video of their translation was replayed as a tool to raise their memories. Throughout the process, the participants were required to reflect on their

decision-making when translating the allusions, especially the difficulties they encountered and their motives and reason for choosing specific strategies to deal with the allusions.

3.1.3 Criteria to Select Source Text

All the participants were dealing with the same ST under the same conditions, translating in both directions to reduce the participants-related variability in two directions. Therefore, the selection of ST is a vital challenge for the whole experiment. Since the research focus is allusions and cultural translation, all the ST in this experiment comes from published novels and prose in both languages. The reasons are three-fold: firstly, literature works like novels have the largest possibility of embedding allusions in the text. Secondly, compared to poetry or news articles that might also contain allusions, novels and prose are more comprehensible for student translators as test material. Thirdly, and most importantly, the novels and prose that originally come from British and Chinese literary works served well for the designated Skopoi, in which the readers read the TTs either for leisure reading or for educational/language and culture learning purposes. The novel and prose are relatively loose requirements on the word count, tones, or rhyme, and therefore, the student translators are less restrained by factors other than Skopos, and thus the decision-making process is more likely to respond to the different Skopos. Nevertheless, in research comparing the translation process in two directions, it is impossible to use the same text. Hence, how to find comparable texts in Chinese and English merits discussion in this section.

3.1.3.1 Selecting the Allusions

Before finding an ST, it would be necessary to make sure that the ST contains allusions and that all those allusions are suitable for the experiment in terms of the difficulties they may present for native speakers and their level of familiarity with the allusions. Therefore, based on the researcher's knowledge, 122 allusions were chosen from English allusion dictionaries and national corpus as they originally came from English culture and could find themselves within the contemporary published literature. However, simply relying on the researcher's judgment would be too subjective. Therefore, the allusion familiarity test was conducted to examine the familiarity and difficulty within national language corpora and among the native speakers of each language. To examine the frequency of the

allusion within the two national corpora, BNC[5] and BCC[6], the number of contexts in the corpus containing the allusion shown in the searching result list has been considered the main indicator. To maintain a similar level of frequency of the allusions in the two corpora, the allusions are selected based on the percentile of 25th, 50th, and 75th of the allusion's frequency in the corpus, respectively. By checking the number of contexts in the result list, a similar number of allusions were distributed between the frequency range 0-3, 4-10-, 11-22,23 and more. Therefore, based on this ratio, 10 English allusions had been chosen from the 122 allusions. In the same vein, 10 Chinese allusions were chosen by calculating the frequency percentile of 175 Chinese allusions, which equally laid between 0-1, 2-9, 10-23, 24 and more.

	Frequencies of 122 English allusion	Frequencies of 175 Chinese allusions
25th percentile	3	1
50th percentile (median)	10	9
75th percentile	22	23

Table 3 Percentile for allusion frequency

English Allusions	Freq in BNC	Chinese allusions	Freq in BCC
Little Engine that Could	0	长安米贵	1
Beard the lion in his den	1	千里鹅毛	1
Gordian Knot	2	洛阳纸贵	2
breadth Never-Never Land	3	缘木求鱼	7
Beyond the pale	3	曲高和寡	9
Sandman	3	风马牛	11
Old Man of the Sea	4	阿斗	18
Candide	4	阳春白雪	22
Yellow brick road	6	削足适履	22
Cheshire cat	18	门外汉	77
Average Freq of Selected	6	Average Freq of Selected	22.5
Overall words in BNC	100 million	Overall words in BCC	300 million

Table 4 Allusion frequency in Corpora

Further sifting of allusions was conducted based on both objective and subjective frequency tests. English allusions were chosen first because there is a relatively straightforward criterion for selecting different types of allusions to ensure the generality of the research. Following Leppihalme (1997)

[5] The BNC (British National Corpus) is a monolingual corpus which records 100-million-word samples of written and spoken British English from a wide variety of genres. The corpus was created with the collaboration of three publishers (with the Oxford University Press as the lead collaborator, Longman and W. & R. Chambers), two universities (the University of Oxford and Lancaster University), and the British Library.

[6] The BCC (BLCU Corpus Center) is a multilingual corpus which created by Beijing Language and Culture University and records about 15 billion words and characters from overall 9 languages.

classification, two of the most common types of allusion should be included in the research, the key-phase and PN. Furthermore, the selected allusions should contain both capitalised allusions (for example, a PN like “Candide”) and uncapitalised ones (for example, a KP allusion like “beyond the pale”) to examine whether the translator would recognise the allusion through case sensitivity. With the least recognised allusions being eliminated, 6 English allusions were chosen based on the previous criterion, and the average frequency in the corpus is 6. Considering the overall words within each corpus and the average frequency of selected allusions, 6 Chinese allusions were chosen after eliminating the least popular allusions. It should be noted that both key-phase and PN allusions are also contained in the 6 Chinese allusions.

To improve the validity of the allusions adopted in the research, a familiarity test was conducted among native speakers of Chinese and English to evaluate the extent to which they acknowledge allusions in real life. Two small groups of people were invited to this online survey, ranging from 18 to 55 years old: 20 Chinese native speakers and 12 English native speakers. All the participants in the familiarity test were recruited from the internet in China and the UK, respectively, and they were asked to rate their familiarity with each allusion on a 5-point rating scale by circling a number from 1 to 5, following an instruction to help them decide: 1 indicates having never seen the allusion before and 5 means being extremely familiar with the allusion. Table 5 shows the same trend as the corpus frequency in Table 4, where the chosen Chinese allusions are slightly more familiar to Chinese native speakers than those English allusions to English natives. The introduction of the native speaker survey worked as an instrument to test the familiarity of the chosen allusions in the native population in both languages, and the results showed that the chosen allusion in two languages did not vary much in familiarity among native speakers.

English Allusions	Median	Average	Chinese allusions	Median	Average
Little Engine that Could	3	3	长安米贵	4	3.381
Beard the lion in his den	2	2.25	千里鹅毛	5	4.55
Gordian Knot	3.5	3.333	洛阳纸贵	4	3.809
Never-Never Land	5	4.25	缘木求鱼	4	3.952
Beyond the pale	4.5	3.75	曲高和寡	5	4.142
Sandman	5	4.167	风马牛	4	3.762
Old Man of the Sea	4	3.583	阿斗	5	4.762
Candide	3	2.833	阳春白雪	3	3.238
Yellow brick road	5	4.5	削足适履	5	4.285
Cheshire cat	5	4.167	门外汉	5	4.714
Median	4.25	3.667	Median	4.5	4.047
Average	4	3.583	Average	4.4	4.060
Selected Median	4.25	3.667	Selected Median	4.5	4.047

Selected Average	3.917	3.514	Selected Average	4.333	4.103

Table 5 Allusion frequency from the survey

3.1.3.2 From Allusions to the Source text

Having selected 12 allusions, an ST would be chosen from the national corpus using a specific allusion as the search term in the same two corpora. Only literary fiction and the novel were involved: the works that hold great fame worldwide were eliminated due to the possible risk of exposure to the participants before the test. Similar to the procedure of allusion selection, the English ST was chosen first. The sentences that contain allusions should come within a paragraph with an appropriate length of 60 to 120 words that would work as the context of the ST in the translation test. Six paragraphs from the same genres (fiction and novels) were chosen and compared in terms of two parameters: readability and word count.

Selected paragraph contains	Flesch Kincaid reading ease	Flesch Kincaid grade level	Smog test	Word count	Test results
Old man of the sea	79.5	5.3	5.6	87	Grade 5, age 10-11
Cheshire Cat	72.4	7.3	8.3	67	Grade 9, age 14-15
Candide	48.9	14.1	12	93	Grade 14, age 19-20
beard the lion in his den	79.1	4.8	5.7	83	Grade 5, age 11-12
beyond the pale	87.5	3.6	5	121	Grade 4, age 9-10
Yellow brick road	68.7	9.3	8.7	114	Grade 10, age 15-16
Translation group A	76.8	6.1	6.5	284	Grade 7, age 12-13
Translation group B	75	6.5	7.3	281	Grade 7, age 12-13

Table 6 Readability of the English STs

Online readability indexes (WebFX, 2019), the Flesh Kincaid readability test and Smog grade test were made on each paragraph, respectively. Higher scores in the Flesh test indicate that a text is easy to understand, while lower scores indicate that a text is difficult to understand; and the SMOG formula uses syllable counts and sentence length to measure difficulty through grades. The test results used the statistics from all readability indexes and suggested the education stages required to understand the texts fully. Based on the test results and word count shown in the table above, six paragraphs were divided amongst translation Group A (highlighted in yellow) and B (highlighted in blue), having similar readability and word count results. No changes are made in the selected English paragraphs to ensure that the ST could express the author's original meaning; therefore, a tiny difference in word count in two groups is tolerated in the experiments.

Meanwhile, it should be seen that the difficulty degree is not definite, as the experiences would vary between individuals and much depends on the preference and skills of the readers. Furthermore, the

level of reading difficulties does not necessarily equal the difficulties of translating. The purpose of the text and the specialisation of the translators could all affect the subjective feeling of an individual's difficulties with the text. In addition, considering that the presenting order of the groups combined with the translation brief 01 and 02 are equally allocated, a small gap between the grades of difficulties is tolerated as long as the overall difficulty level remains similar.

The selection of Chinese ST appeared to be more complicated than the English ones as there is no fully-developed readability test to examine the difficulties of the text except CRIE system in the National Taiwan Normal University: the Chinese readability index explorer, which is still developing its functions. Sentences containing allusions were first selected from the BCC corpora, and those from other genres outside of fiction and novels were excluded. Like the criteria for selecting an English ST, world-known fiction and context length less than 60 or exceeding 120 words were also excluded. Then the selected sentences went through the readability test provided by the CRIE index. Like the WebFX, the CRIE system could display textual features of the words, syntax, and semantics of the selected texts. The readability grades calculation was not available to general users, but the equation to generate the score has been listed in the paper introducing the index (Yao-Ting Sung, Tao-Hsing Chang, Kuo-En Chang, Wei-Chun Lin, & Hsieh, 2016):

> *The readability level of the text= 4.53+0.01*[Difficult words]-0.86*[simple sentences ratio]-1.45*[content word frequency in Logarithmic] +0.02*[personal pronouns]*

However, with all the statistics presented, the equation was found somewhat problematic. It should be noted that the score seemed to be overwhelmingly low for paragraphs in which the word count is less than 200. One of the possible explanations is that, unlike the Flesh test, CRIE seemed to overly emphasise the significance of the text length to the overall readability grade. Furthermore, since the system was conducted based on the corpora of the Chinese language in Taiwan, it was found that the criteria of readability levels in terms of educational stage varied compared to the one in the Chinese mainland. The researcher tentatively analysed two novel pieces in the Chinese textbook of Grade 7, which is the same as the level of the selected English text and the word count was similar to the selected English texts. However, the readability level shows these texts are in Grade 2-3. Following this criterion, sentences with a readability level of over 3 are eliminated, and 9 sentences are left.

Selected	Readability	Word count	Translation	Readability	Word count
阳春白雪	1.3437	75	Group A	2.4776	282
阿斗	2.025	104			
缘木求鱼	2.1017	103			

洛阳纸贵	1.835	131	Group B	2.6759	283
曲高和寡	2.2035	64			
门外汉	2.125	88			

Table 7 Readability of the Chinese STs

Considering the readability level (between level 2 and 3) and word count, six sentences were finally chosen from 9 sentences, each containing a different allusion (see Table 8). A single sentence to be translated was too short to be analysed through the readability test, and therefore, the word count was considered the most effective measurement when comparing the sentences. Since no change was made to the English ST, a strict criterion was made on the Chinese underlined sentences to control word count. The identification of words in English and Chinese tend to be very different, and the criteria for counting words also varied. For longer paragraphs, translators in practical scenarios normally adopted a rough ratio between characters (Chinese) and words (English). However, it would not work for sentence-level STs. Therefore, the researcher took the results from the online word-count engine as a reference but mainly counted the words manually. Given the limited time and resources, it could effectively and efficiently guarantee the STs' comparability as much as possible. Minimal change to the ST was made without affecting grammar or the meaning of the text to ensure the word count of every single piece of the paragraph was very similar, and the word count of the ST could maintain the same level.

Underlined sentence (ST)	Word count		Underlined sentence (ST)	Word count	
Old man of the sea	40	76	阳春白雪	25	76
Yellow brick road	18		阿斗	21	
beard the lion in his den	18		缘木求鱼	30	
Cheshire Cat	18	82	洛阳纸贵	31	82
Candide	48		曲高和寡	18	
beyond the pale	16		门外汉	33	

Table 8 Word count of the STs

3.1.4 Participants and Ethical Consideration

Given this research exploring translation between Chinese and English and focusing on cultural translation, it required the participants to have a good command of both English and Chinese and be able to translate in both directions. Furthermore, the participants must have the necessary knowledge of English and Chinese, not only in the linguistic area but also in the cultural background.

Since there is limited access to English L1 translators dealing with Chinese and English translation and in reality, the number of this group is extremely small, there is no English L1 speaker involved, and all the participants in this study are Chinese L1 translators. Having participants from English translation

majors would also serve as one of the purposes of this research: to gain insight into the Chinese translation training program on directionality and cultural translation. Meanwhile, the University where this experiment took place and the participants mainly came from Beijing International Studies University (BISU), which ranks 6th among the 15 universities in China that provide translation courses for future translators.

This research adopted a distinction between two groups of translators based on translation experience and considered their level of education (Undergraduate or Postgraduate). In the translation training system in China, the translators are required to have certificates to work in this profession, and only trainees that have taken the training courses provided by a university or college are allowed to register for the qualifying exam. Therefore, the level of education of the translator and translation experiences are closely related in most cases. Depending on the two factors, participants were assigned into two groups: Undergraduate in English and Translation major (seen as junior student translator) and Postgraduate in Translation major (seen as advanced student translator).

Postgraduates (advanced student translators) were the main body of the participants; overall, 122 postgraduate students took part in this research by completing pre-test questionnaires, and 36 of them were recruited to participate in the experimental translation test based on their answers in the questionnaire. As mentioned in section 3.1.2.1, the participants answered the questions relating to their learning and translation experiences. Only the Postgraduates who have experience in translation practice, for example, in a part-time job and have done the translation in both directions, would be invited to participate in the following experiment. Having Postgraduates as the majority of the participants benefits the research in two ways. Firstly, all the Postgraduates had taken the national Postgraduates examination to be enrolled in graduate schools in BISU, which means that it can be ensured that they have a relatively high level of proficiency in English and knowledge in translation practices and translation theory since the university will only give offers to the students who acquire comparably higher grades in the national exam which tests language proficiency and related knowledge. As a result, there is no need for a separate proficiency test to choose qualified participants. Based on the researcher's experiences and later confirmed by the questionnaire, most postgraduates already have some experience working as part-time translators, if not professionally. Therefore, they could be considered novice translators who have limited experience in translation and still need further training. Moreover, most Postgraduates chose to develop their studies, being either interested in academic translation research or practical translation experience; therefore, they

are more likely to have the enthusiasm to participate in the research and have more experience concerning translation to talk about.

Twenty-two undergraduates were recruited in this research and finished the questionnaire in the first phase. They are not expected to have experience in translation practices like part-time or full-time jobs, making them junior student translators. Only seven students who have acquired training in translation into both L1 and L2 and successfully passed the TEM-4, or equal (CET-6), were invited to participate in the next step of the translation test. The TEM Band 4 (test for English major band 4) is a national English competence test, especially for university English major students. The validity of the exam in testing English competence has been proved by Chinese researchers (X. H. Gong, 2011; Meng, Gu, Zhou, & Zhong, 2017; Zeng & Shen, 2016). Therefore, in this research, this criterion-referenced test was adopted as one of the criteria to choose Undergraduates with higher proficiency in English. The Undergraduates have been involved in translation training for two years, both in L1 and L2 translation. Therefore, having Undergraduates as participants is expected to reflect the actual translation training systems in the Undergraduate degree from their point of view and performances.

The research is performed with the ethical consideration of the human participants involved. For one thing, the researcher should take the responsibility of ensuring the well-being of the study participants as a priority, in a trustworthy manner (Gay, Mills, & Airasian, 2012). For another, studies focusing on human participants' contribution or performance should presuppose all the potential risks that might happen to the participants to affect their performance and eliminate the risks as much as possible, such as fatigue, stress, or lack of confidence. Regarding this research, all the technologies applied, including eye-tracking, key-logging, and retrospective interview, have no hazard to the participants. The only issue is that the translation process would be more than 1 hour and may cause slight tiredness in their eyes. There were multiple breaks between translation tasks, if needed, to minimise the risk of eye fatigue or a sore back. The ethical application of this study was reviewed and approved by the Faculty Ethics Committee and Research Integrity and Governance team of the University of Southampton.

The students were firstly invited to attend an introductory session; in which they were provided with the Participant information sheet (see Appendix C). The form consisted of 6 categories: profile of the researcher and the research interest; the purpose of the research and its procedures; possible benefits and risks involved; privacy and confidentiality; their rights as research subjects; contact detail, and authorisation of consent. They were given time to consider, and if interested, they could contact the researcher through the email on the participant leaflets to have a pre-test survey to

complete and then arrange an experiment session. There were cash reimbursements (local currency equal to £5) for the participants' time in this experiment.

Participants' details remained strictly confidential. Research findings in any reports or publications will not include information directly identifying the participants without their specific consent. Participants' personal information was coded randomly not to be identified by the researcher in the following data analysis procedure. All the questionnaires were locked in a secure place, including consent forms. All the data from the translation test and the interview recording were password-protected in both the researcher's computer and hard disk and were uploaded to the secure research data storage provided by the University of Southampton, where only the researcher had access to those data. Meanwhile, their right to have a copy of the results and their right to withdraw anytime during the experiment were notified to the participants. Once they agreed with the conditions, they were required to sign the consent forms (See Appendix C) to provide formal consent.

3.2 Data Collection and Preparation

3.2.1 Eye-tracking Data

All the eye-tracking data comes from the Tobii Studio software that ran the analysis and generated heat maps and the numeric dataset for further analysis. Translog, being plugged into the Tobii Studio, also generated eye-data at the same time, and this data works as a backup plan in case any unexpected situations happen.

3.2.1.1 Eye-data Metrics

All the eye-tracking metrics analyses in this research are generated from Tobii Studio. More than one kind of eye-tracking data will be taken into account to measure the cognitive effort.

Total task length: the total time a participant spends on each task. This is a fundamental measurement of many research studies (Ferreira et al., 2016; Hvelplund, 2014). By comparing the time spent on tasks in different translation directions or categories of AOIs, considering the text difficulties and word counts, it provides a basic conclusion for further analysis.

Total Fixation duration (TFD): the sum of all fixations within all AOIs or in an entire translation task. This metric is relevant to the analysis as it goes one step further into the cognitive area to find any differences in total fixation time between the different directions or categories of AOIs. Taking the fixation into account could provide more reliable results for discussion related to cognitive efforts.

Total Fixation count (TFC): The number of times the participant fixates on an AOI or in an entire translation task. This metric is not frequently used as a total fixation duration in eye-tracking experiments (TYCOVÁ, 2015). However, since it is one of the four indicators of cognitive efforts in the study of Ferreira et al. (2016) researching directionality of translation, and pointed out by Jacob and Karn (2003) that fixation count is increasingly common in the usability studies, it has been considered as one indicator of cognitive effort in this research.

Visit count/Revisit count (VC): A visit refers to a period of time when a participant first focuses on an AOI until the one move where they gaze out of the area. Revisit count, therefore, means the number of times the participants returned their gaze to a defined AOI. Participants would repeatedly visit an AOI when the content tended to be demanding to comprehend (Tobii, 2020).

3.2.1.2 Eye-data Quality

Before the further discussion on the eye-tracking data, it is essential to filter out the flawed data from the dataset. The flawed data refers to the eye samples of the participants collected in unsatisfactory or under unpredictable conditions; that failed to reach specific quality standards to ensure the validity and consistency of the samples. Previous studies proved that the quality of eye data is sensitive to many factors, although some are manually controlled before the test (e.g. light, distance from the screen); other unpredicted issues may have occurred during the test (e.g. participants' optical condition, unexpected movement or personal need from the participants).

To minimise the possible effects of low-quality data, four data quality criteria were introduced to evaluate the quality of eye samples (Hvelplund, 2011): a) gaze sample percentage; b) mean fixation duration; c) the percentage of gaze time on the screen (GTS) and d) gaze sample to fixation percentage (GFP).

Gaze sample percentage provided a straightforward overview of how many eye samples have been captured during the process. As previously mentioned, the eye-tracking experiment was conducted under the monitoring of Tobii Studio software, which can generate a gaze sample percentage of each participant in the replay view, providing an overview of how well each eye sample was being collected. According to the principle embedded in the software, each gaze sample of each eye during the recording was analysed and marked following the Tobii validity code to indicate the eye-sample recording quality. Most participants' samples were collected in a satisfactory condition, except one showing low percentages in all four recordings. Therefore, participant P08 has been eliminated

permanently from all the following analyses and discussions because of the low capturing percentage (see Appendix A).

Similar to the threshold of pause, fixation duration required a criterion to define whether a recording was worth investigating. N. Pavlovic and Jensen (2009) removed the recordings in which mean fixation duration (MFD) are below 200 milliseconds in their study of translation directionality. Hvelplund (2011) applied the same threshold to eliminate un-acceptable data, while Sjørup (2013) discarded data less than 180 milliseconds. Since this thesis also explores directionality in translation, the lower threshold of mean fixation duration is set to be 180 milliseconds. As shown in Appendix B, all the MFDs below 0.18 have been highlighted for further consideration of data filtering.

Another measurement of data quality was the percentage of gaze time on the screen (GTS). As implied by the name, this was a simple calculation of total fixation duration as a percentage of total task time (GTS=Fixation time/Task time). A high GTS ratio may indicate that the tracker captured the participant's eye movement over a long time, collecting abundant data. In the translation experiment in this thesis, it can be articulated that sometimes the participants will look away from the monitor to type the TT and therefore, the percentage will never be as high as 100 (see Appendix C). Contrarily, the lower threshold of the GTS is set to be 50%, as Hvelplund (2011) claimed a threshold level of approximately 30% GTS for his participants, while the most recent research Wang (2017) on eye-tracking and directionality set the lower threshold as 70%. It should also be noted that since the participants are only allowed to consult online dictionaries and resources, the total fixation duration also includes the gaze time searching external resources.

The last criterion compares the total number of gaze samples with the total number of gaze samples formed part of fixation (see Appendix D). It is believed that during the reading process, the saccades constitute 5 to 15% of all eye movement, and the gaze samples take up the rest (Hvelplund, 2014). Following this trend, Hvelplund (2011) set the lower threshold at 75 % since translators often look back and forth more than simply reading the text. This research planned to adopt the 70 per cent slightly lower than Hvelplund (2011) because the Chinese input system is more complicated than simply typing the character on the keyboard and therefore may cause lower GFP (Wang, 2017).

To sum up, two of the participants, P08 and P30, have been excluded from the further data analysis due to the low quality of eye-tracking, being unable to reach the requirement of more than one among the four tests. P09, P22 and P23 are being excluded as well due to unfinished translation tasks. In total, the invalid case percentage is 14.3%.

3.2.1.3 AOIs: Area of Interests

The Macro AOIs refers to the larger area of interest, as shown in Figure 9: the orange upper left area outlined the ST AOI, which represents comprehension of the ST; the yellow lower left area is the production of the TT, and the green area on the right side is the browser that the participants use for consulting external resources. This analysis focuses on two macro AOIs: 1) ST and TT areas representing the translation process; 2) External resources area in which the translators do searching/consulting behaviour. The cognitive effort is explored through the total fixation duration (TFD) and total fixation count (TFC) allocated in the corresponding area.

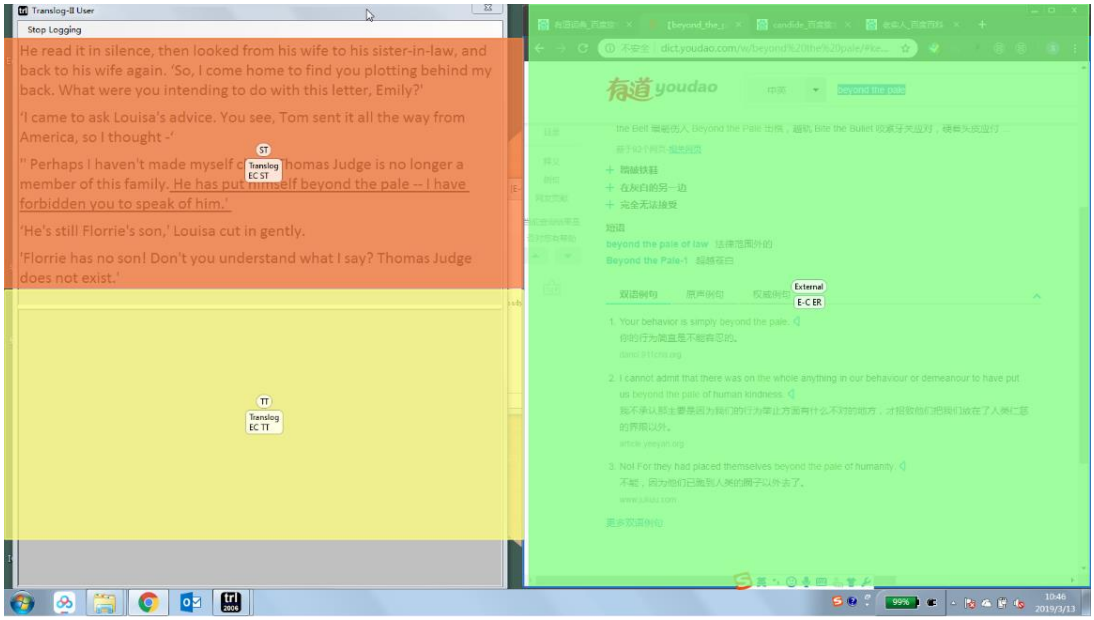

Figure 9 Macro AOIs

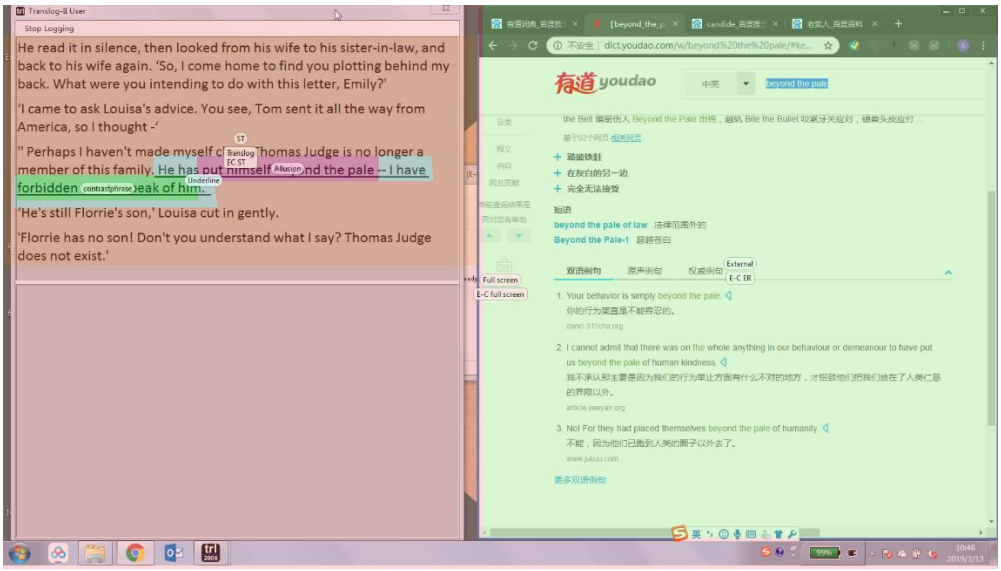

Figure 10 Micro AOIs

Unlike the Macro AOI areas (ST, TT, ER), Micro AOI are relatively small and were set around the target items. The screenshot in Figure 10 shows the Tobii Pro Studio window in which the AOIs are defined. The border of the AOIs in the Tobii Pro Studio extended halfway into space around the target items of the AOI to accommodate any inaccuracies in recording the eyes' position. Three more AOIs have been defined right on the top of the ST AOI within each sub-task. The underlined sentence that the participants were required to translate is blue, and the targeted allusion is defined in purple. The green area is where the contrast non-allusive phrase is located, and it is the same length of the corresponding allusion AOI in the sentence.

3.2.2 Key-logging Data

Before eye-tracking was used as a data collection method in research on the translation process, the pause analysis from the key-logging technique was adopted frequently to measure the cognitive effort throughout the translation process. The correlation between pauses and cognitively effortful processing can be dated back to the theories of Butterworth (1980), "The more the delays, the more cognitive operations are required by the output" (Butterworth, 1980, p. 156). Similarly, Schilperoord (1996) pointed out that pause analysis looks into the cognitive process and cognitive attention. They both agreed on pauses as indicators of cognitive effort in cognitive processes involving planning and problem-solving. Pause analysis has been applied to gauge the cognitive aspect in much translation process research (M. Carl & Kay, 2011; Dragsted, 2005; Immonen & Mäkisalo, 2010; Jakobsen, 2003, 2011; Kumpulainen, 2015; Screen, 2016).

All the key-logging data collected from the Translog-II are automatically output as XML files, which log every single key-stroke at the exact time spot in milliseconds. For instance, the software will generate an XML named CE01A1 if a participant has finished Text 1 in translation Group A under the guidance of Brief 01, which is the Chinese to English translation. Each key-stroke activity contains information regarding the time of each movement of the key and cursor position and movement simultaneously.

```
<Mouse Value="Down" Time="15959" Cursor="0"/>
<Mouse Value="Up" Time="16068" Cursor="0"/>
<Key Height="33" Width="21" Y="447" X="3" Value="1" Time="17675" Cursor="0"
    Type="insert"/>
<Key Height="33" Width="15" Y="447" X="16" Value="." Time="17784" Cursor="1"
    Type="insert"/>
<Key Height="33" Width="8" Y="447" X="23" Value=" " Time="18455" Cursor="2"
    Type="insert"/>
<Key Height="33" Width="22" Y="447" X="29" Value="P" Time="37659" Cursor="3"
    Type="insert"/>
<Key Height="33" Width="21" Y="447" X="42" Value="e" Time="37815" Cursor="4"
    Type="insert"/>
<Key Height="33" Width="22" Y="447" X="55" Value="o" Time="37908" Cursor="5"
    Type="insert"/>
<Key Height="33" Width="22" Y="447" X="68" Value="p" Time="38127" Cursor="6"
    Type="insert"/>
<Key Height="33" Width="14" Y="447" X="81" Value="l" Time="38314" Cursor="7"
    Type="insert"/>
<Key Height="33" Width="21" Y="447" X="87" Value="e" Time="38408" Cursor="8"
    Type="insert"/>
```

Figure 11 XML file output

Each XML file was imported into an Excel worksheet for preliminary data filtering, re-organising the intervals in start time ascending order that could easily find out “the time of inactivity between the keystrokes” (Rosenqvist, 2015, p. 10) by simply calculating the time from the start time from a key-stroke to the start time for the next key-stroke. At the same time, a new SPSS dataset is set up with each line coded as an ID variable based on the translation direction and the randomly allocated number of the participant, e.g. the variable coded as "13_EC01A1" came from an XML file conducted by the participant 13 translating the piece EC01A1, who is doing the L1 translation.

3.2.2.1 Typing Test

Both key-logging and eye-tracking contributed to the data collection in the typing test section as the starting point of the overall experimental translation test. As implied in the methodology chapter, Translog recorded the keyboard activity made by the participants and generated every timestamp when a key was being pressed. The latter timestamp minus the former one forms the gap between each key-stroke in milliseconds. Those gaps recognised as two levels: typing speed and pauses as cognitive indicators will be the research focus in the key-logging analysis.

The typing speed was calculated from the typing test before the translation experiment, where participants were required to read the experiment introductions and type in the target area. As mentioned in the last section, the Translog generated a log file for each participant, including the timestamp and position of each key-stroke. The mean typing speed for English and Chinese, as well as the overall mean speed, can be seen below. No extremes or outliers were found in both three groups of average typing speed (See Figure 12), indicating that no participant was typing outstandingly fast or slowly compared to others.

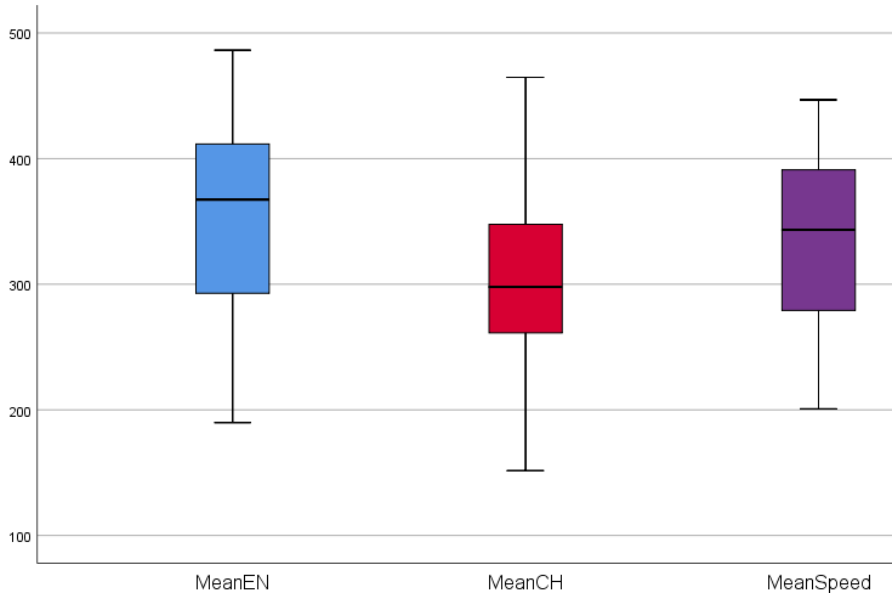

Figure 12 Participants'typing speed

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Mean EN	356.373	34	84.263	14.451
Mean CH	302.540	34	71.492	12.261

Paired Samples Correlations			
	N	Correlation	Sig.
Mean EN & Mean CH	34	0.755	0.000

Paired Samples Test								
	Paired Differences					t.	df.	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Mean EN-Mean CH	53.833	55.794	9.569	34.366	73.301	5.626	33	0.000

Table 9 Participants' typing speed

The Sig in the paired samples test is 0.000, which indicates a significant difference between the typing speed of English and Chinese among participants. From the mean in the paired sample statistics chart, we can conclude that the English typing speed consumed more time than the Chinese typing speed. This conclusion is not surprising in that English as a second language of the participant is less familiar to them when typing on the keyboard than Chinese as their first language. The significant difference between the two languages raised concerns that the different levels of typing fluency may contribute to issues during key-logging. The pause in the TT production, for example, is essentially defined by the typing speed. If the pause is seen as an indicator of cognitive effort, the different typing speed of languages is likely to impact the Pause analysis. As a result, simply relying on the key-logging analysis to explore the cognitive effort in the translation forces might not be convincing

enough as it depends mainly on the Pause analysis. Therefore, this research focused on the eye-tracking analysis and took the key-logging as a supplementary method.

3.2.2.2 Pause threshold

As the data collection technique developed, the translation process can be recorded on the computer through the key-logging software shown as typing activities, and the measuring accuracy has been improved to 1-millisecond precision, providing more detailed pausing analysis. However, while not all pauses can be regarded as significant, there is an unavoidable discussion on the thresholds of the pauses as it is the criteria to define whether a pause is qualified in terms of duration for analysis. In translation, a translator pauses to read a segment in the ST and processes it to transfer the message into the TL before typing (Dragsted, 2012). Therefore, the processing time can be explicitly reflected from the pause duration, and different lengths of pauses seemed to be related to the different amounts of cognitive effort. Overwhelmingly short pauses may result in meaningless data that reflect no corresponding cognitive process, while excessively long pauses may involve more than one process that cannot be distinguished from one another. On the other hand, setting the minimum or maximum length of typing pause is closely related to the analysis of the TT. In the paragraph, pauses that are too short will yield neither cognitively nor linguistically plausible segments, producing meaningless data for text analysis. In contrast, lengthy sets would neglect pauses that are essential for the study.

It is impossible to know exactly the proper length of pause that is cognitively significant for process study; most researchers have resorted to a fixed value that made sense to their data and analysis. The typical threshold for pause was set at 1 second for many related studies in translation research. Jakobsen (2011) set a pause unit to 0.20 seconds and suggested that a pause length of one second is appropriate to investigate delays in a text production event. However, Alves and Vale (2009) pointed out that a significant pause length is 5–6 seconds. The variation of the pause threshold seemed arbitrary but, at the same time, logical. Due to diverted research settings and objectives, a certain length of pauses worth investigating in one study may tell a different story in another. For instance, Jakobsen (1998) excludes pauses of more than 10 seconds as they appear less systematically to signify particular text segments; however, for research that relates to lexical decisions or dictionary searches, the 10-second pause could be valuable to explain the phenomenon (Heilman & Neuman, 2016). Although many pause studies have adopted a fixed value for the minimum pause, individual differences in processing should not be neglected. Dragsted (2005) indicated that the length of

significant pauses is also individual by calculating the size of the translation unit in relative times based on the typing speed and the time spent by her subjects. There is currently no study on the pause threshold for Pause analysis in the translation area; however, similar research can be borrowed from writing research that focuses on the lower-threshold of pause, especially for key-logging methods. Rosenqvist (2015) indicated the justification for a fixed length of the pause, 2 seconds, would be weak and may be too long to notice some interesting phenomenon; he instead tried to find another way to define pauses based on the individual typing speed. Having participants write in their second language and being key-logged throughout the process, Rosenqvist (2015) found that whether on word or sentence level, there is a need to take the individual participants writing ability into account. The median *2 can be a better measurement for pause. This study will consider both sides of the discussion, setting a fixed value for the pause threshold based on the individual L1 typing speed, and according to the typing speed in Appendix D, the median of the individual mean typing speed reached no more than 300ms. Therefore, the lower threshold has been defined as 500ms, expecting more interesting phenomena.

3.2.3 Survey Data analysis

All the data from the paper-based questionnaire was logged into the SPSS software ready to be analysed, and the post-test questionnaire, which was done by the students taking part in the eye-tracking experiment, was an online questionnaire and would automatically generate as a report with one press. Since the Likert scale was applied in this questionnaire, the statistical test used in SPSS ranged from the most basic Frequency test to the Mann-Whitney U test[7] and Spearman rho correlation test[8]. Meanwhile, the Freidman test was applied to the ranked-order questions to look for differences in median values among more than two related samples.

Compared to the analysis of the questionnaire data, the analysis of interview data was more complicated and time-consuming. The cue-based retrospective interviews conducted after the eye-tracking experiment were recorded and needed to be transcribed. Given that the retrospective interview is a piece of narrative research in which the participants needed to reflect on their past experiences, it is unavoidable to have some features of conversation like pause, repetition or self-

[7] The Mann-Whitney U test (MWU test) compares the differences between the two independent groups on a continuous measure for the non-parametric Likert-scale data and it compares medians (Julie, 2016).

[8] A Spearman correlation test or Spearman rank correlation describe the correlation, the direction and the strength of the relationship between two variables when the variables are not normally distributed, whether the two variables are associated with each other.

correction or some characteristics of the voice. Nevertheless, since the interview focuses on the choice of strategies and the reasons behind them, the transcription of the recording only focuses on the content of the speech and filters out all the other features. Meanwhile, as it is a cue-based retrospective interview in which the screen recordings were provided to the participants, the participants' narrations do not go too far from the research interest. It largely lessens the workload to reduce the interview data to distil down to the core of the materials (Roulston, 2014). After transcribing all the recordings, the researcher conducted precise correction and translation before inputting them into the Nvivo for qualitative analysis. Nvivo is a tool specially designed for qualitative data analysis, and all the checked transcripts from participants' interviews and their TT were imported as individual files, ready for coding afterwards. The constructing coding frame on the data was essential, being "at the heart of the method" (Schreier, 2014, p. 6). According to RQ, the coding frame for the transcription was adapted into two main categories: the translation strategies, a top-down classification, and the rationale for the decision-making, which is the bottom-up summarisation.

Applying the modified framework of Leppihalme's (1997) model on the translation strategies for allusion as the fundamental model, the setting of subcategories was a concept-driven procedure with translation direction as the first layer of subcategories, allusion types as the second layer of sub-sub categories and specific translation strategies as the final layer of further subcategories (See Figure 13). With a clear structure of coding frame, strategies to which participant resort will be selected from the TT and the verbal report of the participants and the data will be labelled corresponded to these strategies. The software would automatically retrieve the data with the same label and calculate the frequencies and identify trends and patterns.

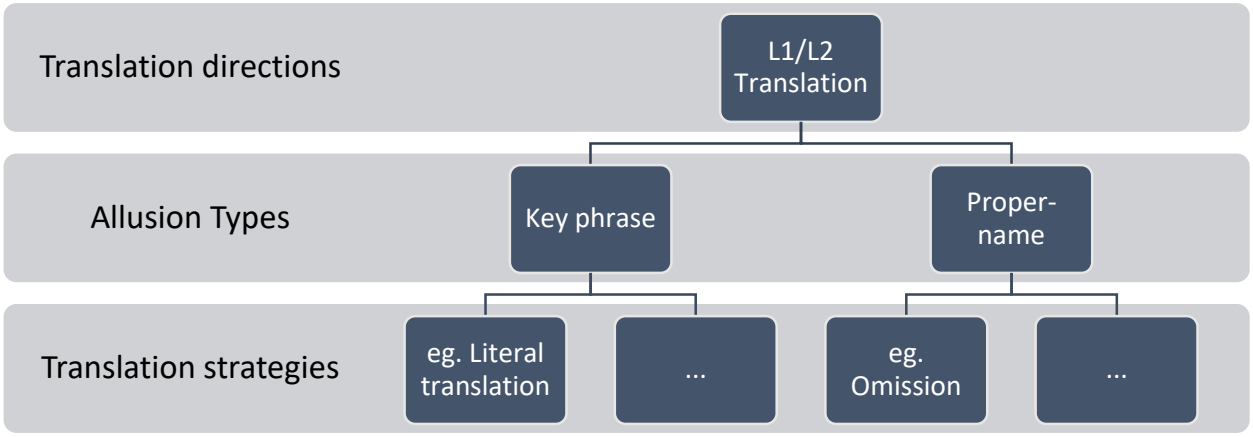

Figure 13 Coding frame for qualitative analysis on Translation strategies

By locating the strategies, it would be easier to target the reason for choosing the strategies since the narrators usually give reasons right after describing their choice. The coding frame for the bottom-up main category is similar to the previous one as follow:

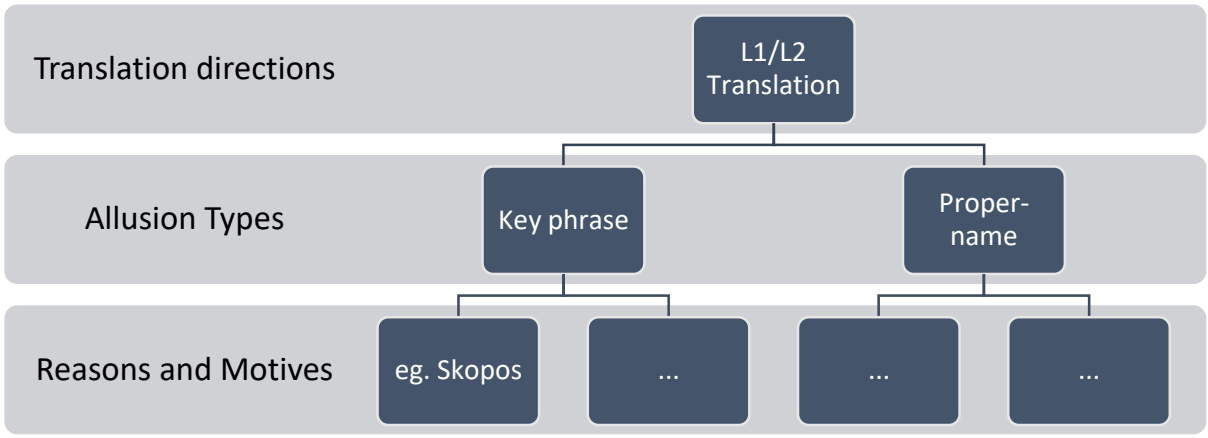

Figure 14 Coding frame for qualitative analysis on reason and motives

What differentiated it from the first frame is that the further subcategories are no longer presupposed but in data-driven categories. To be more efficiently generating subcategories from hundreds of lines, a series of steps of subsumption can be applied: finding similar or relevant concepts in the material. When encountering relevant concepts, researchers subsume the concept under the respective subcategory or create a new subcategory for new concepts until nothing new can be found (Schreier, 2014).

3.2.4 Quantitative Data Analysis Model: GLM and GLMM Analysis

The research design to simulate the actual translating environment of the participants make it a quasi-experiment in nature. In theory, both pure and quasi-experiment can be adopted in eye-tracking research in translation studies; however, the quasi-experiment has been more suitable in naturalistic settings (Doherty, 2018). It is vital for the pure experiment to control the dependent variables and ensure the randomisation of the population. However, the pure experiment's low ecological validity and decontextualisation are not suitable for the translation practice as they mostly take place in natural settings and might be influenced by various potential factors in the process. For instance, in research dealing with cognitive effort in allusion translation processing, it is unlikely for each allusion to be identical in word count or familiarity level, but at the same time, the research should include more than one type of allusion in the ST to reach a reliable conclusion. Therefore, researchers who focus on the translation practice in actual settings mostly subscribe to a quasi-experiment design (Sjørup, 2013; Vieira, 2015; Wang, 2017). The quasi-experiment observed variables

of interest and captured data in ecologically valid environments without much control and manipulation. It allowed the researcher to observe the participants in natural settings with higher external validity but might be lacking the power of results due to the impact of unknown variables compared to a highly controlled pure experiment.

To deal with the data from the quasi-experiment and minimise the effect from undefined variables or the relationship between variables, the Generalised Linear Mixed Models (or GLMM) have been adopted. It fitted better with the data collected in a more naturalistic experiment by isolating effects for individual variables. A simple linear regression estimates the relationship between a predefined dependent variable and one or more independent variables and predicts how the dependent variable changes if one or some of the independent variables vary, co-vary or are held fixed. The GLMM is an extension to the GLM (Generalised Linear Model), which includes the random effects. Based on the simple linear regression model, the GLM (Generalised Linear Model), which is a compound regression model with a general model formulation, incorporating various statistical models like linear regression for normally distributed responses, logistic models for binary data and log-linear models for count data. The strength of GLM over the other linear models is that the GLM allows the dependent variable (target variable) to be non-normally distributed and specify the distribution or link function.

Meanwhile, both the categorical variable such as translation Skopos and the scale variables like allusion familiarity and AOI length will be taken into account in the analysis at the same time. In this case, both participant-oriented and text-oriented factors are considered in a single analysis. Two factors need to be predefined before the analysis in the GLM as fixed variables and co-variables. Fixed factors refer to the categorical variables with a fixed number of levels that may recur throughout a data set (Balling, 2008), like Experience (Undergrads, Postgrads) or Skopos (leisure, educational)—(for details of the variable description, see following paragraphs). On the other hand, co-variables are continuous or scale variables that may affect the indicators. GLMM combines the characteristics of GLM and the mixed models (models that include both fixed and random predictor variables). It can effectively handle a dataset including crossed random effects, based on a complex multilevel model that involved 30 valid participants with 12 allusions each.

3.2.5 Quality assessment in the translation of allusions: The PACTE acceptability model

It is unavoidable to include the evaluation of the translation product when it comes to data triangulation. Hvelplund (2011) also addressed the possibilities of how analysis of the TT could

further explain the findings related to the cognitive process in translation. However, given the fact that no applicable evaluation model towards the translation of allusion has been developed yet and evaluating translation production would essentially not be within the core scope of this process-oriented thesis, the evaluation model adopted in this thesis will not focus on identifying the "good" and "bad" solutions but attempting to support the findings in the cognitive processing from the perspective of products.

The possibility of settling on a universal preferred model which can apply to all circumstances remains doubtful among researchers. From different perspectives, they have contributed to the variety of assessment models in the translation field. Incorporating with the textual and contextual analysis, House (2015) quality assessment model evaluates the TTs from three branches: Language, Register and Genre and therefore could only apply to the textual level translation output. N. Pavlovic (2007a) evaluated the TTs through error analysis by quantifying the errors found in the translation outputs. Examiners, according to N. Pavlovic (2007a), marked red for the "unacceptable" section and yellow for the "revisable" section and then deducted 1 point for each red mark and 0.5 for yellow to come up with the final marks to reflect the level of "acceptability". Although conducted on the longer texts, N. Pavlovic (2007a)'s assessment model applies to smaller units like sentence and phrase and, therefore, could be referential to the present study on allusions. However, her model is a bit problematic in the way that the final marks do not help identify the causes of errors and which competencies could be improved for junior translators. Her model over-simplified the assessment process to the level of acceptability among participants, without any intention of exploring the relationship between translation quality and translation competence.

Scholars have widely accepted the term acceptability regarding quality assessment. PACTE (2009) specifically defined it as "whether or not the solution found effectively communicates (a) the meaning of the source text; (b) the function of the translation (within the context of the translation brief, the readers' expectations, genre conventions in the target culture); and (c) makes use of appropriate language" (A. Beeby et al., 2009, p. 217). The definition took the understanding of the ST (Meaning), the language expression in the TT (Language) and the context, genre and the readership (Function) into consideration, and based on these three branches, conducted a criterion model to assess the acceptability (see Figure below). The translation solutions are examined under three branches respectively and graded as Acceptable (A), Semi-acceptable (SA), Non-acceptable (NA) and came up with twenty-seven possible permutations by triangulating these categories. Then each categories was assigned by a numeric value: A = 1; SA = 0.5; NA = 0 (see Table 10 below).

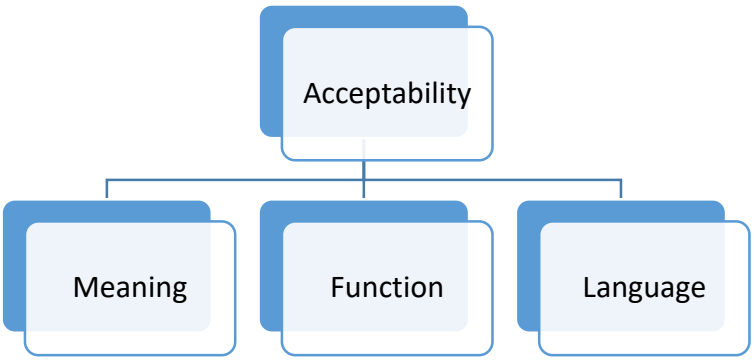

Figure 15 PACTE Acceptability model

Meaning	Function	Language	Category	Numeric Value
A A A A SA	A A SA SA A	A SA A SA A	A	1
A A A A SA SA	A SA NA NA SA A	NA NA A SA A SA	SA	0.5
A SA etc.	NA SA	NA NA	NA	0

Table 10 Categories Permulations

The acceptability model from PACTE (2009) was adopted as the criterion to assess the quality of the translation of allusion in this research. The reasons are three-fold: firstly, the three branches, Meaning, Function and Language, fit the scope of the research accurately, looking at the understanding of the source allusion, the expression of allusion, and the skopos highlighted in the translation brief provided to each participant. Secondly, it looked at the micro aspects of translation and therefore worked with the smaller segments, e.g. allusions and the allusive sentences. Thirdly, and most importantly, it quantifies the assessment process as numeric value for quantitative analysis to shed light on the relationships between quality and the essential variables, i.e. directionality, allusion type and skopos in the cognitive processing analysis.

Since the results are only expected to be used as supportive references, the researcher herself would be the only one to grade the TTs. To maintain the credibility of the analysis, all the TTs were coded and graded twice (on separate days) in random order to prevent the recursiveness effect. Differences

in grades between two times were revised again, and the TT was re-graded for the third time. To better incorporate the model into the translation of allusion, the criterion of the grading in three branches have been defined as below:

Meaning: Whether the translators can understand the meaning of allusions
• A: Correctly understand both the meaning and the connotation • SA: Partly understand, missed part of meaning or connotation • NA: Entirely misunderstanding/fail to recognize
Function: Whether the translation served the functions
• A: TT served the functions, i.e. Skopos, Context, Readership and Genres • SA: TT failed to serve up to two functions • NA: TT failed to serve more than two functions
Language: Whether the translators can appropriate express the TT
• A: Translator can appropriately express the meaning of allusion in a fluent and natural TT • SA: Translator can incorporate the meaning of allusion, although the TT is not very fluent and natural • NA: Translator failed to produce a fluent, logical and natural TT

Table 11 Grading criterion

Chapter 4 Quantitative findings from the Questionnaires

This chapter records all the findings from the pre-test questionnaires and post-test questionnaires by the participants. The findings, ranging from the participants' personal profiles, their attitudes to translation directionality, to their feedback about the translation of allusions, are expected to provide insights to explain the results from the eye-tracking data and the choice of strategies in the translation process. A copy of the questionnaire has been attached in Appendix B.

4.1 Findings from the pre-test questionnaire

All 122 students[9], both Postgraduates (82%) and Undergraduates (18%), were invited to participate in the Phase One Pre-test questionnaire and provide information about their language and academic background, translation expertise and experience, and attitude towards translation directionality. Here are the main findings from Phase One:

Language and academic background

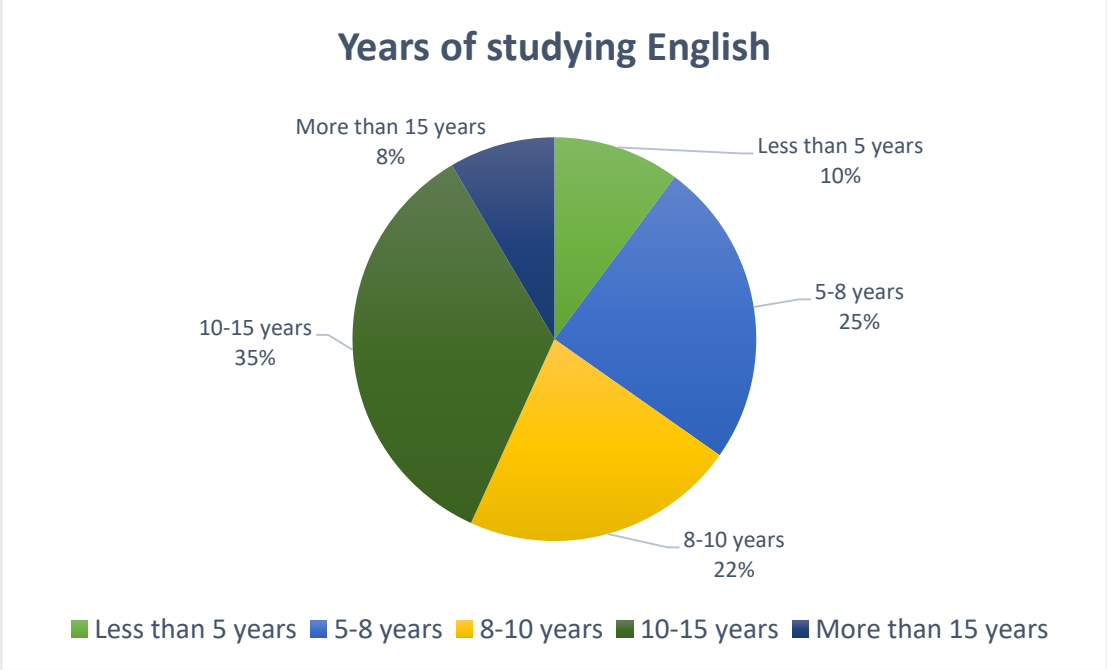

Figure 16 Years of studying English

[9] Participants in the Phase 2 eye-tracking translation experiment were selected from 119 valid respondents based on specific criteria, see Chapter 3.2.4.

At the time the survey was carried out, while a quarter of the participants had studied English for 5-8 years and 22% had studied English for 8-10 years, the majority of the 118 valid participants were comprised of 35% who had studied English for 10-15 years and 8% who had been studying English for more than 15 years. 10% of them had been learning English for less than 5 years.

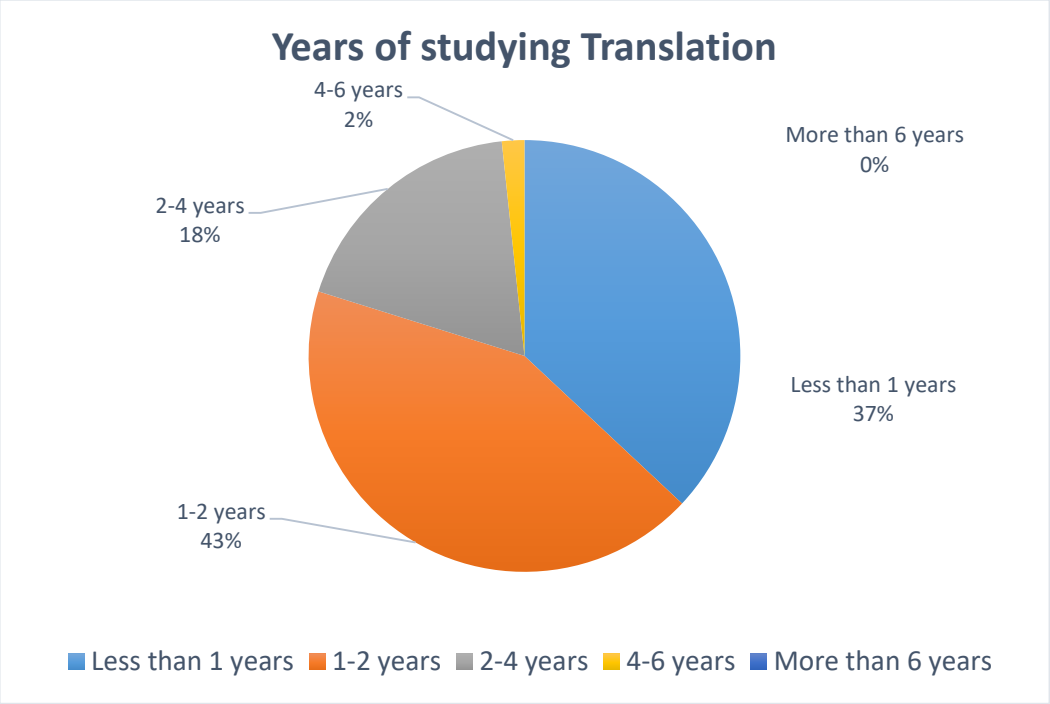

Figure 17 Years of studying Translation

Compared to their time spent studying English, the time spent studying Translation shows a slightly different pattern, as nearly 80% of participants, both Postgraduates and Undergraduates, have been studying Translation for less than two years. Among the rest of the participants, 18% have been engaged in Translation studies for 2-4 years and only 2% for more than four years.

The different pattern of translation learning background compared to English language learning is not surprising. As the first major “foreign” language in China, English has been introduced to the Primary School curriculum in some developed cities, while for some remote rural areas, the promotion of English in education is quite limited. Therefore, English proficiency among College students can be widely varied, as some learned English at a very early age, and yet others may start learning a foreign language only from High School age. On the other hand, systematic translation training mainly applies to the Higher Education sector; only language students considering to become translators are eligible for this training. Except for the participants who majored in Translation Studies and learned Translation theory from their Fresher year, most participants get theoretical knowledge of translation studies from their second or third year.

Considering the participants comprised of two groups, Undergraduates and Postgraduates, it is worth looking at the difference of time spent in English language learning and Translation training between Undergraduates and Postgraduates. The Mann-Whitney U test (MWU) has been introduced to test the differences between the two independent groups on a continuous measure for the non-parametric Likert-scale data as it compares medians (Julie, 2016).

Mann-Whitney U test

	Undergraduates, Postgraduates	N	Mean Rank	Sum of Ranks
Years of learning English	0	22	78.66	1730.50
	1	99	57.08	5650.50
	Total	121		
Years of learning translation	0	22	63.86	1405.00
	1	100	60.98	6098.00
	Total	122		

Test Statistics

	Years of learning English	Years of learning translation
Mann-Whitney U	700.500	1048.000
Wilcoxon W	5650.500	6098.000
Z	-2.705	-.372
Asymp. Sig. (2-tailed)	.007	.710

Table 12 MWU test on Years of learning English and translation

The test reveals a significant difference (Sig=.007) in the distribution of years of English study between Undergraduates (M=78.66, n=22) and Postgraduates (M=57.08, n=99). Combined with the frequency chart, it is surprising that the Undergraduates tended to have a higher level of English study (in years) than the Postgraduates, which means Undergraduates could have a long history of learning English than the Postgraduates did. One of the possible reasons could be a language learning gap during undergraduate college among the Postgraduates participants who may instead undertake non-English majors during their Bachelor's degree. Whereas the Undergraduates in this survey, who have undertaken an English or Translation major, have devoted nearly four years in systematic

language learning during the undergraduate degree. They are very likely to devote more time to English learning than some of the Postgraduates.

No significant difference (Sig=.710) is shown in the distribution of participants' years of Translation training between the two groups. This may correspond to the result in the Frequency test, which showed that most of the participants, regardless of their grades, have been trained to be Translators in less than two years.

Genres most familiar to work with

Two questions aimed to find out what kinds of text the participants mostly access, irrespective of whether it is for translation work, personal reading or listening. These questions are ranked responses, and thus the data was subjected to the Friedman Test[10], which looks for differences in Median values between more than two related samples (Field, 2013). By comparing the mean rank of each option, the test presents summarized results of familiarity with genres in both languages among the participants.

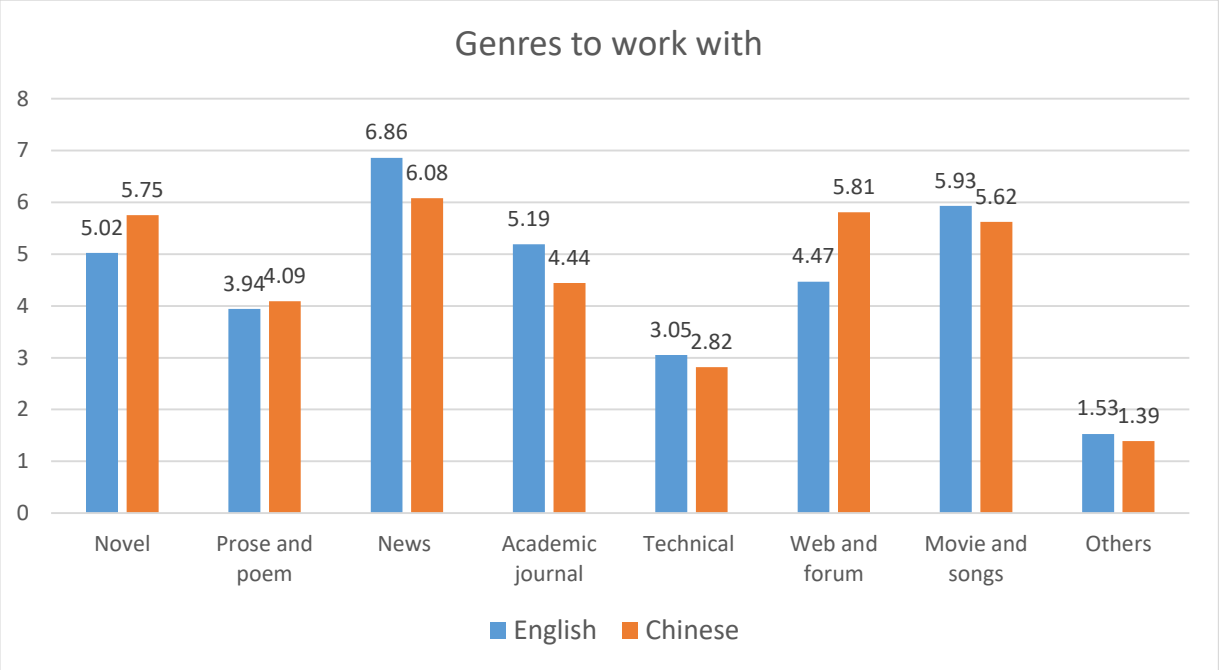

Figure 18 Genres familiarity in English and Chinese

[10] The Freidman Test is the non-parametric alternative of the two-way ANOVA, assuming that interactions between independent variables may affect the results.

In Chinese and English, news text is the most common genre the participants touch upon in their language learning, translation training, and translation practice. Movies and songs rank second in the English language chart, while web and forum text is the second most popular genre for the Chinese language. Despite the "other" genres, in which none of the participants provides examples of this genre, the technical text is the least popular genre in both languages. Also, it is worth noting that poems receive far less attention in both languages, while the novel ranked higher in Chinese than in English.

Satisfaction with L1 and L2 culture knowledge

This question aims to find out to what extent translators considered themselves to understand both English and Chinese culture. Running the MWU test on the question enquiring about participants' self-evaluation of their cultural knowledge, it has been found that for satisfaction with their level of L1 and L2 culture understanding, distributions follow similar data patterns across the two groups of participants, meaning that level of the study did not affect the self-evaluation of their cultural knowledge.

Test Statistics		
	knowledge of English culture background	knowledge of Chinese culture background
Mann-Whitney U	1034.000	867.000
Wilcoxon W	1287.000	1120.000
Z	-.576	-1.740
Asymp. Sig. (2-tailed)	.565	.082

a. Grouping Variable: Undergraduates, Postgraduates

Table 13 MWU test on knowledge of English and Chinese culture background

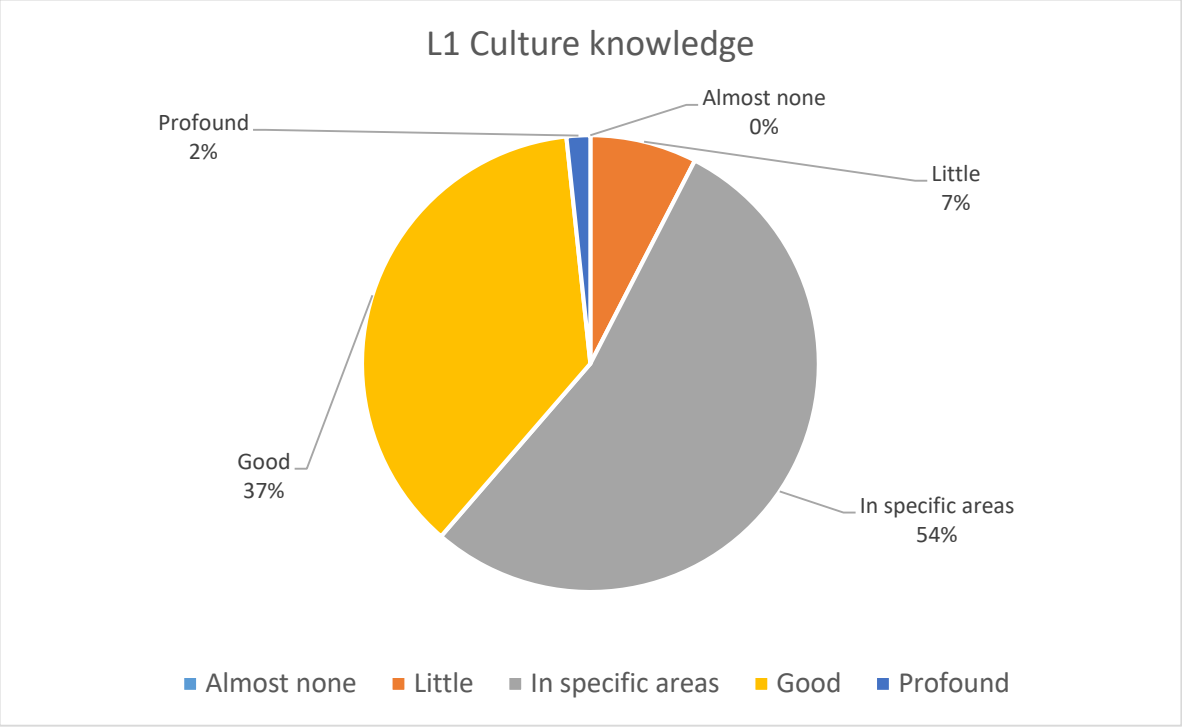

Figure 19 Self-evaluation of L1 culture knowledge

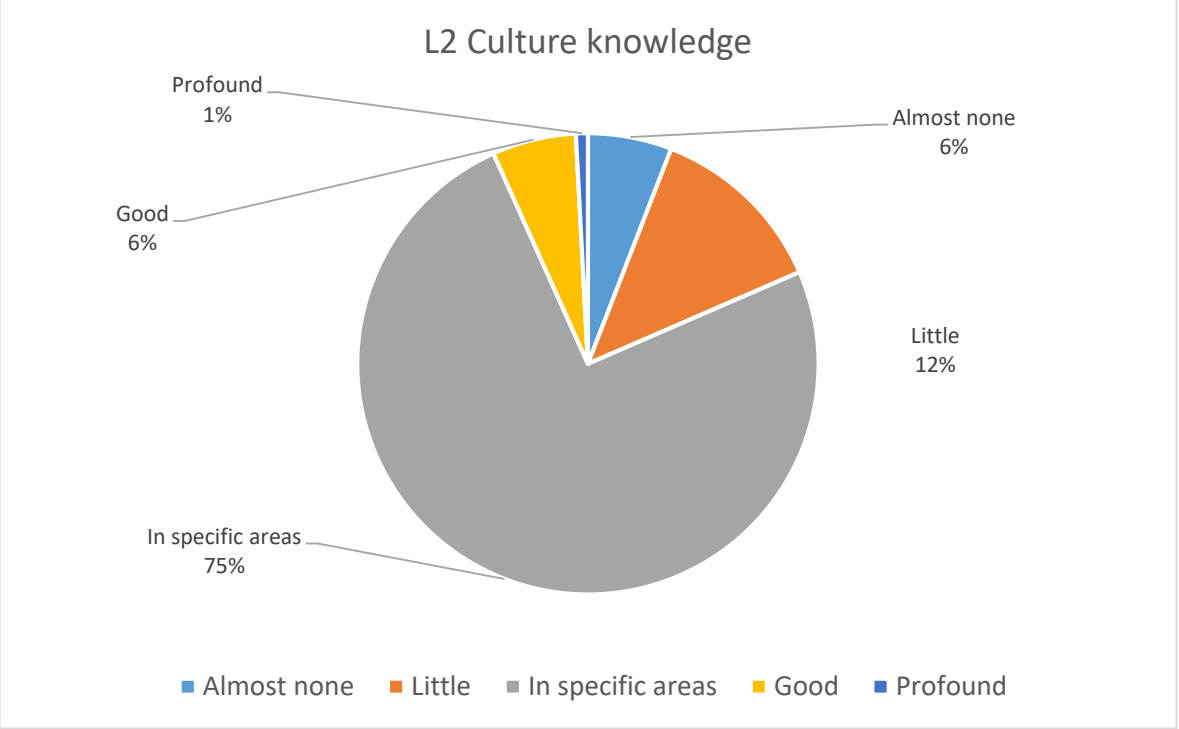

Figure 20 Self-evaluation of L2 culture knowledge

The frequency chart shows that 54% of the participants consider themselves to have L1 knowledge in certain areas, and 37% believe they are confident in their L1 cultural knowledge. 2% of them believed that they have profound knowledge of L1 culture, and surprisingly, still, 7% are not confident about

their knowledge about L1 culture. Besides the possibility that participants are simply modest, the lack of confidence could be due to three reasons. Firstly, people tend to underestimate their abilities when they perceive the task as challenging (Kim, Kwon, Lee, & Chiu, 2016) since they have been notified before conducting the questionnaire that there will be a translation test afterwards. Secondly, they underestimate their ability due to the lack of external feedback on their cultural knowledge as there is no sufficient objective assessment of their cultural knowledge in the translation training curriculum. Thirdly, a small number of participants are indeed unsatisfied with their insufficient L1 culture knowledge, which leads to more troublesome translation problems than expected in translation practice.

Compared to the translators' L1 culture background, their L2 culture understanding is more difficult to define for the participants. With three-quarters of participants indicating that they may have certain knowledge within some specific areas in L2 culture, participants in general presented negative views on their expertise in L2 culture. Furthermore, 6% of the participants reflected that they have little L2 cultural knowledge, and 12% demonstrated that they do not know much about L2 cultural knowledge, meaning that the lack of L2 knowledge among the pre-service translators should not be overlooked. This statistic raises a concern about whether their acknowledged weakness would affect their translation, especially cultural translation.

The proportion of Training-load and Workload in L2 translation versus L1 translation

In all cases, 52% of participants have a similar C-E and E-C translation load in their coursework and daily training. Nearly 40% accomplished less coursework and training in L2 translation than L1 translation, in which 8% of them have less than 25% of training in L2 translation. On the other hand, 8% of the population received more training in L2 translation, and 1% have even more than 75% of coursework and training in L2 translation.

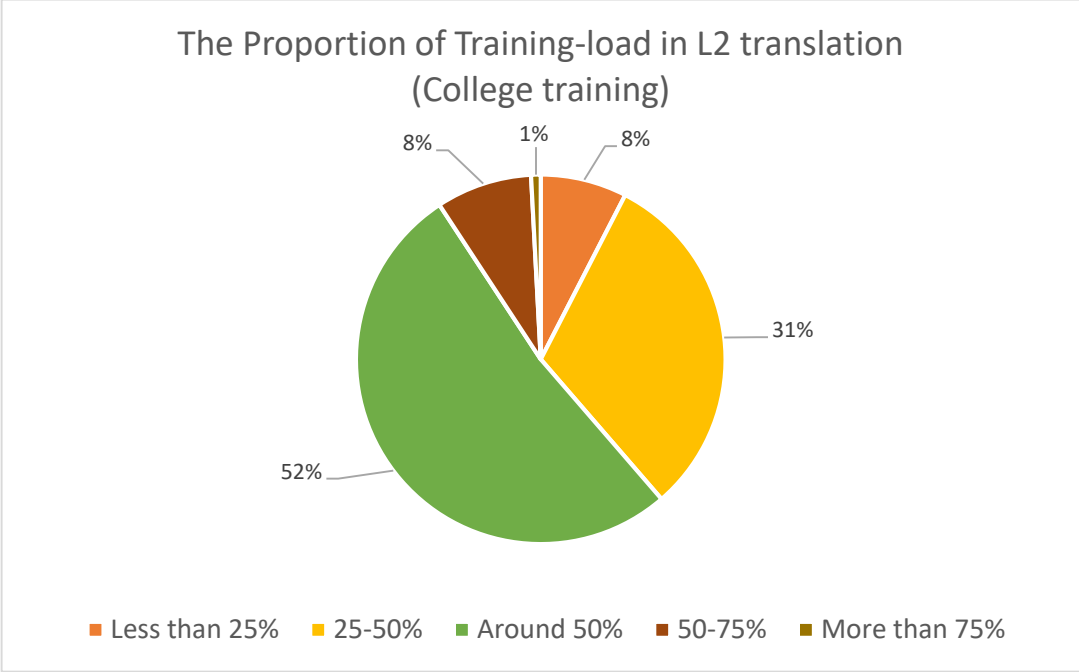

Figure 21 The Proportion of Training-load in L2 translation (College training)

Meanwhile, the MWU test shows no significant difference (p=.875) in the proportion of L2 translation between the Undergraduates and Postgraduates. Therefore, it could be reasonably assumed that a greater proportion of students are doing more L1 than L2 translation in their coursework at university, both in Undergraduate and Postgraduate studies.

Test Statistics	
	The proportion of L2 translation in their coursework
Mann-Whitney U	1078.500
Wilcoxon W	6128.500
Z	-.157
Asymp. Sig. (2-tailed)	.875

a. Grouping Variable: Undergraduates, Postgraduates

Table 14 MWU test on the proportion of L2 translation (College training)

The participants who have experience in translation practice were also asked about their proportion of L2 translation practice in this study. As illustrated by the figure below,38% of them stated that they have no experience. With the order of the workload in L2 translation from low to high, the Less than 25%, the 25-50%, the Around 50%, the 50-75% and the More than 75% occupied 7%, 27%, 17%, 9%

and 2% of them, respectively. It is noted that only 11% of them have more working experience in L2 translation than L1 translation.

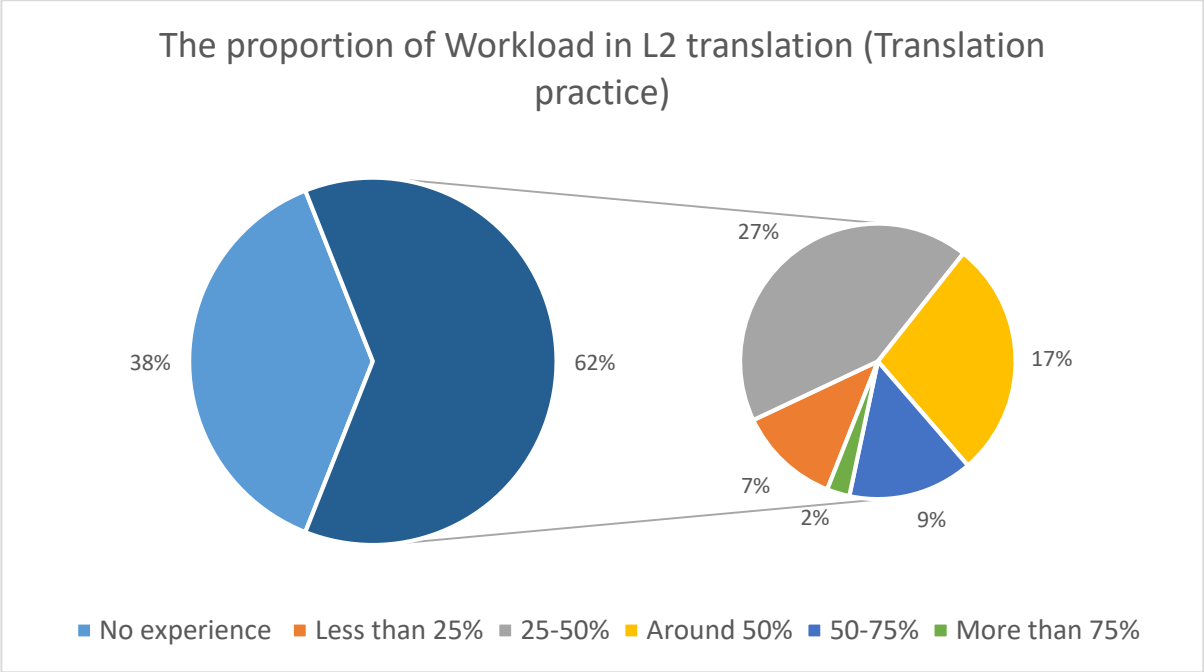

Figure 22 The proportion of Workload in L2 translation (Translation practice)

Considering the proportion of L2 translation between translation training and translation practice reported by the participants, it can be interpreted that the translation training curriculum tends to be slightly more L1-translation-oriented in this population. This corresponds to the practical translation market need.

The proportion of training on culture-loaded expression and literary translation

This section explores whether the participants had any translation training to help them deal with literary translation and translation of culture-loaded expression.

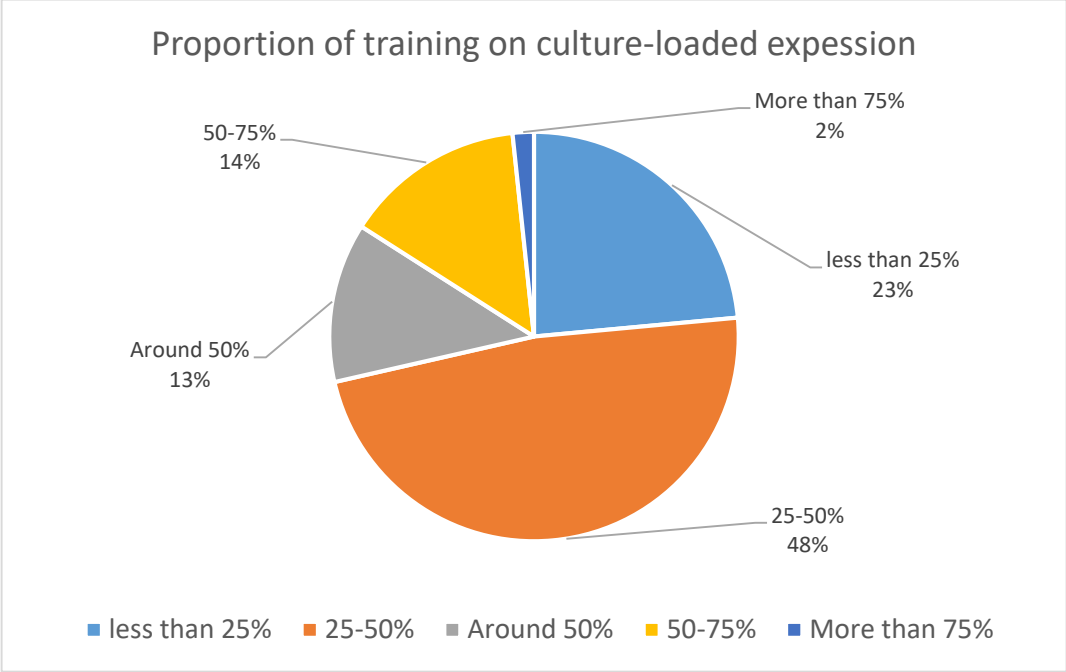

Figure 23 Proportion of training on cultural translation

Nearly 30% of respondents claimed that their training on culture-loaded expression took up half or more than half of the total translation training, with 2% even receiving three-quarters of their translation training as culture-loaded translation. However, 48% of participants state that the proportion of cultural translation training they received took up 25% to 50% of their overall translation training. Moreover, 23% of them received cultural translation training, equalling less than a quarter of their total translation training time.

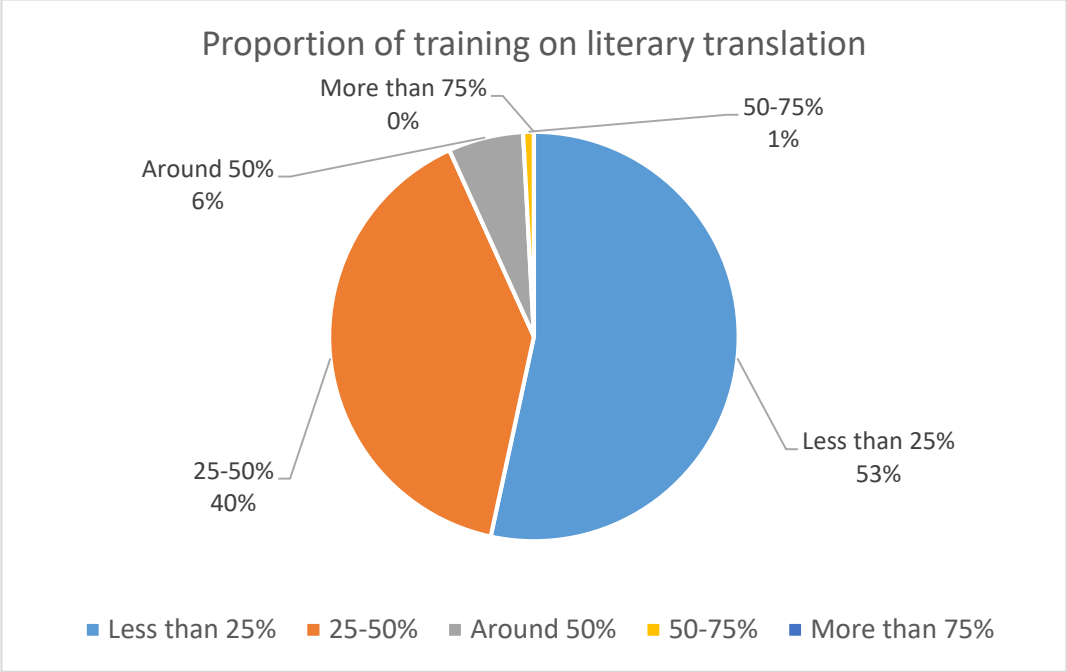

Figure 24 Proportion of training on literary translation

Compared to cultural translation training, the literary translation component in translation training presents a far less percentage for participants. With more than half of the participants receiving less than 25% of literary translation as part of their total time spent studying Translation, 93% of the participants have had literary translation training for less than half of their translation training. Considering that 80% of the participants had no more than two years of translation training overall, literary translation training is somewhat limited.

Attitudes regarding directionality

The following questions are designed to find out the participants' attitudes towards L1 and L2 translation, based on their own experience translating in two directions. Participants were first asked whether they found one direction of translation more difficult than the other. An MWU test indicates no significant difference in the attitudes of difficulty between Undergraduates and Postgraduates (p=.646).

Test Statistics	
	Difficulty comparison between E-C and C-E translation
Mann-Whitney U	1025.000
Wilcoxon W	5975.000

Z	-.460
Asymp. Sig. (2-tailed)	.646

a. Grouping Variable: Undergraduates, Postgraduates

Table 15 MWU test on difficulty comparison between two directions

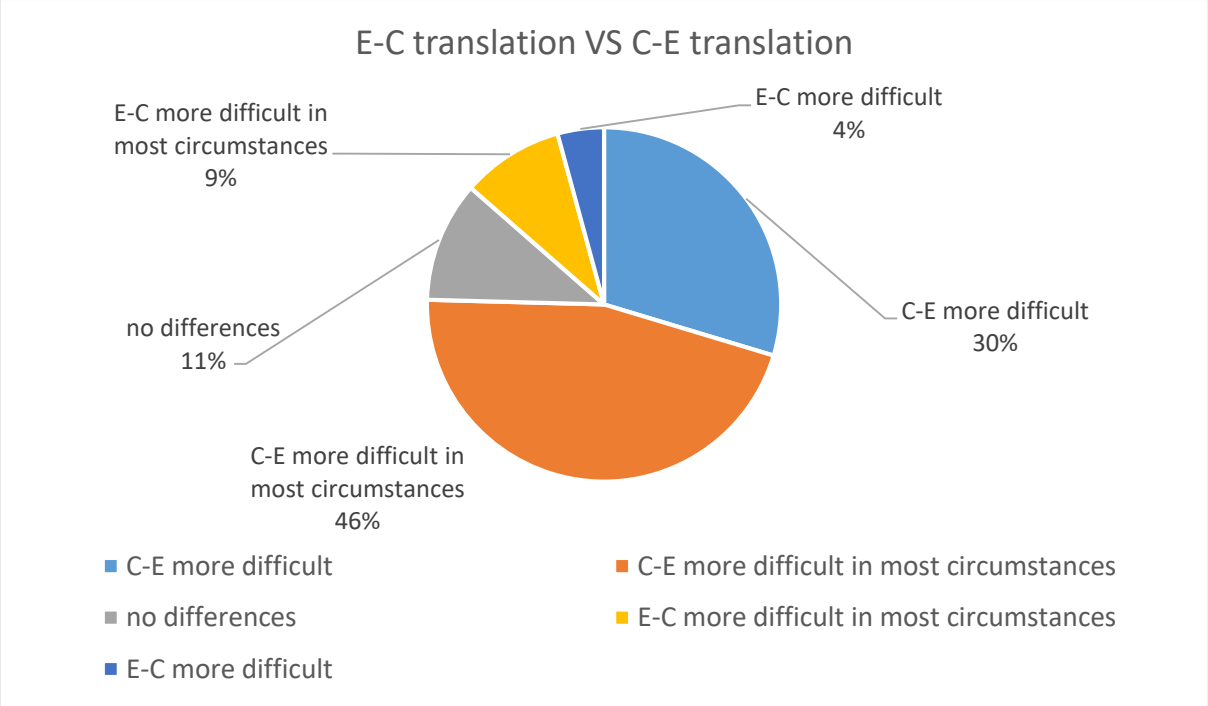

Figure 25 Difficulty comparison between two directions

A majority of the participants (76%) predictably state C-E translation, which is L2 translation, to be more challenging to work with than the other way around. Apart from the 13 students who expressed no difference between the two directions, nearly 13% declared that L1 translation is more difficult for them. What should be noted from the table is that, among all the answers that consider one direction to be easier than the other, the majority of the participants are not all perfectly confident that it would happen in all cases. Instead, most of them (46% in 76% and 9% in 13%), regardless of the direction, believed that there would be some circumstances, if not many, where the situation would reverse.

Importance of factors influence the translation

In this question, the participants were asked to rank the order of four factors that would possibly influence the quality of their translation output according to their importance. It aimed to look at the participants' attitudes on balancing their cultural knowledge and linguistic knowledge, the target text

and source text during translation. The Friedman Test has been applied to compare the mean rank of all the options.

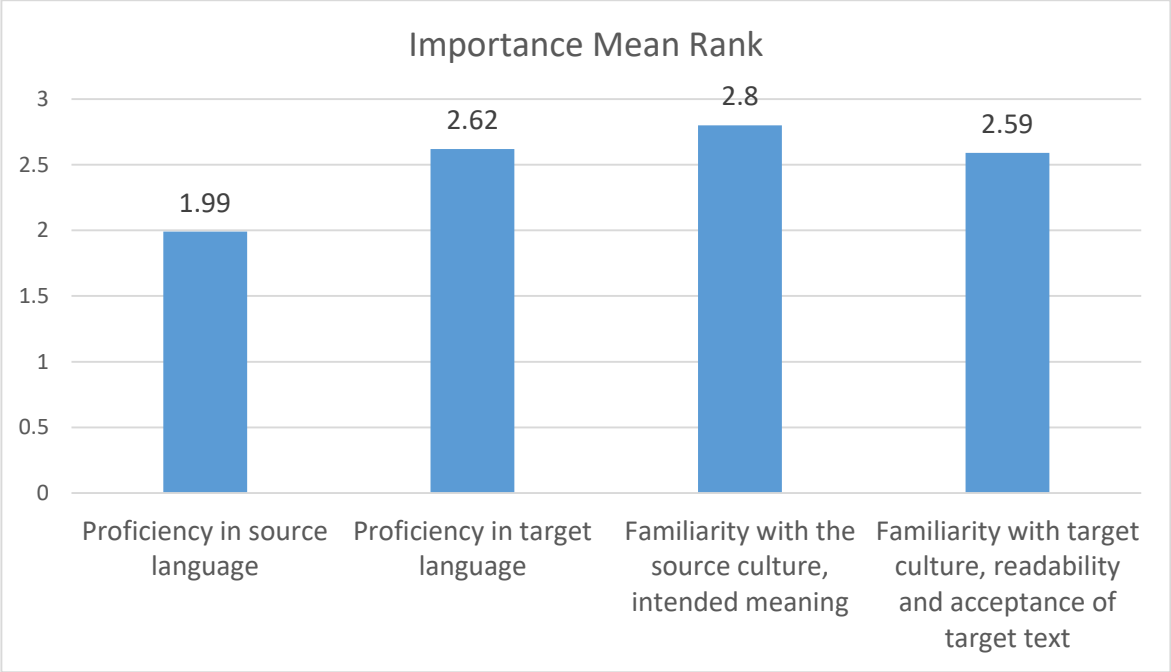

Figure 26 Importance of factors that influence the translation: ranking

Participants are not entirely preferred target or source factors, nor did they prefer linguistic over cultural factors. The participants consider familiarity with the SC and the intended meaning to be the essential factor determining their translation quality; in contrast, they rate proficiency of source linguistic knowledge as the least important factor for them. In the target area, they believed that proficiency in target linguistic knowledge is slightly more important than familiarity with the TC, producing acceptable outputs; in the source text area, they declared that cultural knowledge tends to be more essential for their quality of translating than linguistic knowledge. From the mean rank, we can assume that participants might struggle with the importance of cultural and linguistic knowledge in the target area (due to a similar mean rank), while their preferences are relatively clearly shown in the source text area. They consider target language proficiency to be more critical than the source language to the TT, but target cultural knowledge is seen as less crucial than the SC understanding.

Statements related to the ST and TT importance

This question is designed to gauge the participants' attitudes about statements regarding the ST and TT in the translation process. An MWU test and Spearman's Rho Test have been conducted respectively to check whether the level of study or working experience has affected participants'

attitudes in this area. The MWU test shows no apparent differences between the Postgraduates and Undergraduates in their attitudes towards these statements. Meanwhile, Spearman's Rho test results indicated that participants' translation experience would not affect their response to these statements.

MWU Test Statistics[a]	
	Understanding source text is more important than producing the target language
Mann-Whitney U	1070.000
Wilcoxon W	6120.000
Z	-.217
Asymp. Sig. (2-tailed)	.828

a. Grouping Variable: Undergraduates, Postgraduates

Table 16 MWU test on the importance between ST and TT

	Spearman's rho	Understanding source text is more important than producing the target language
Length to work as a full or part-time translator	**Correlation Coefficient**	.093
	Sig. (2-tailed)	.310
	N	122

Table 17 Spearman's rho test on the importance between ST and TT

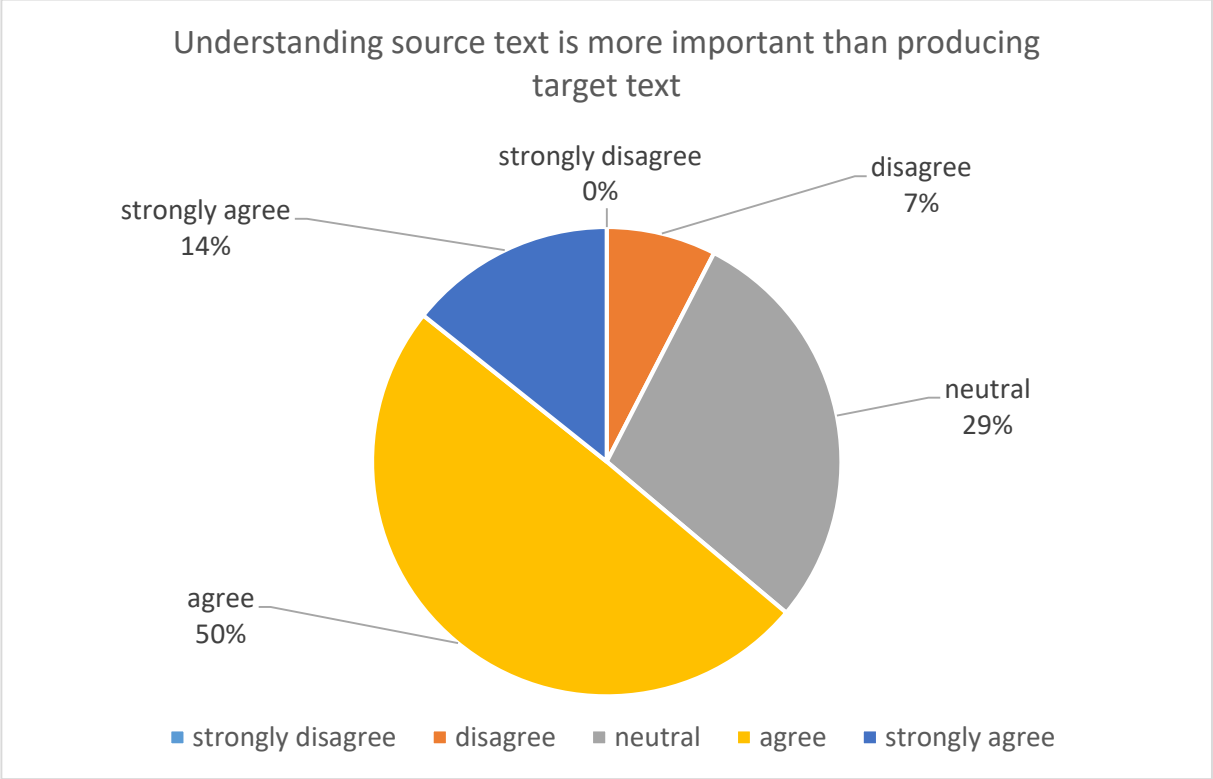

Figure 27 The importance between ST and TT

The answers for the first statement have partly corresponded to the conclusion made in the previous one, that for the participants, it is of most significant importance to fully understand the source text than to produce the target text. Besides half of the participants presented positive attitudes about this statement, 14% strongly agree that the ST outweighs the TT in importance in their translation tasks. Still, 29% of them stayed neutral in their observations; 7% disagreed with the statement.

4.2 Findings from the post-test questionnaire

After the translation test, 43 participants were asked to fill out a post-translation Survey, which enquired about their experience in the translation of allusions. They were asked to state the following, a) to what extent they agreed or disagreed with the statements about the translation of allusions; b) strategies they have learned and applied to deal with allusions; and c) factors that determined their choice of translation strategies. A copy of the survey has been attached in Appendix B.

English allusions VS Chinese allusions in the reading and translation process

The first two questions asked about the experience of dealing with allusions in the reading and translation process in English and Chinese, testing whether allusions could be a bump for student translators in both directions. As shown on the graph, the shade of colour goes darker as frequency increases. An MWU test was conducted beforehand, and data showed no differences between the two groups of participants in both English and Chinese. In other words, whether the participants are Postgraduates or Undergraduates would not affect their evaluation concerning the degree of difficulties in understanding allusions.

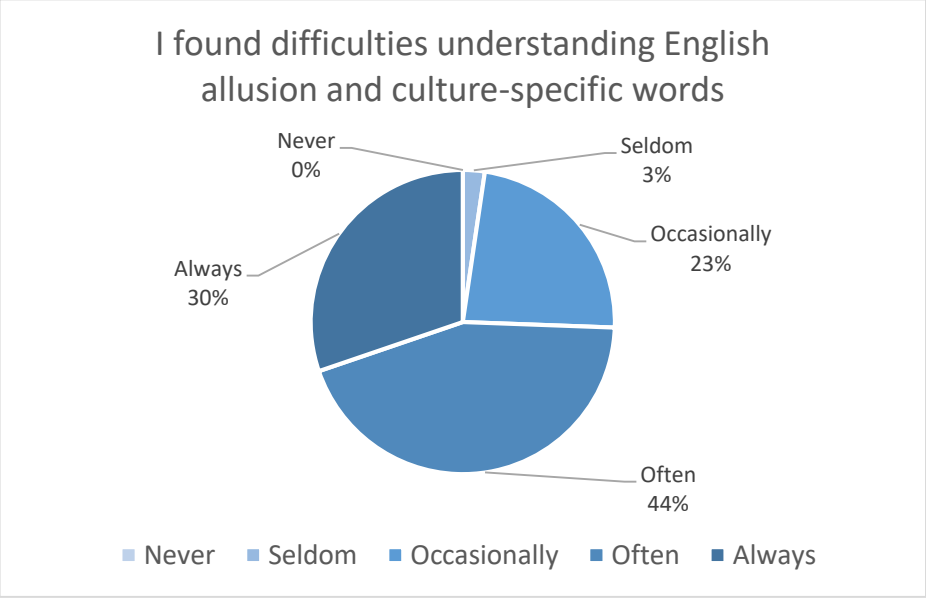

Figure 28 Difficulties in understanding English allusions and culture-specific words

As expected, understanding L2 allusions would never be easy for participants. 44% of the participants indicated that they often found understanding English allusions challenging; 30% further found that this issue always happened in those processes. Indicated from 0% in the first category (Never), it can be confirmed that all of the participants have confronted difficulties in understanding English allusions. Meanwhile, 3% of the participants believed that these kinds of difficulties seldom worried them in their reading and translation process.

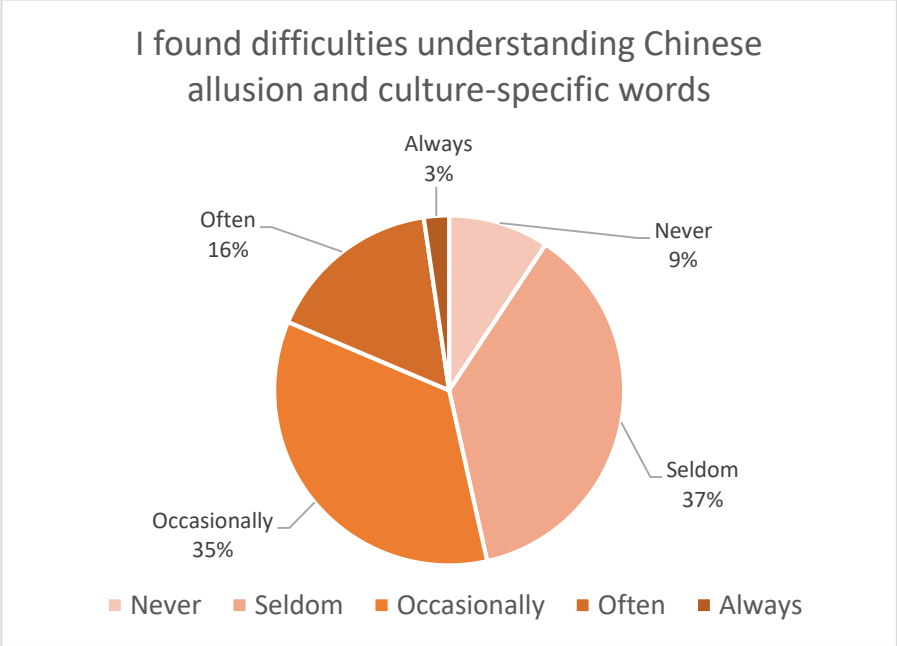

Figure 29 Difficulties understanding Chinese allusions and culture-specific words

On the other hand, although Chinese allusions originated from the L1 of the participants, one participant stated that understanding Chinese allusion is always a problem in their reading and translation process. Furthermore, 16% of participants also considered that it appeared in relatively high frequency for them. However, quite a number of the participants (37%) believed that this problem seldom happened in the reading and translation process, and 9% of them never confronted this kind of difficulty when understanding Chinese allusions.

Background and the intended meaning of the allusions

This section finds out the extent to which the participants would know about the background and intended meaning of the allusion. The MWU tests indicated no significant difference between the participants' educational background groups on their responses.

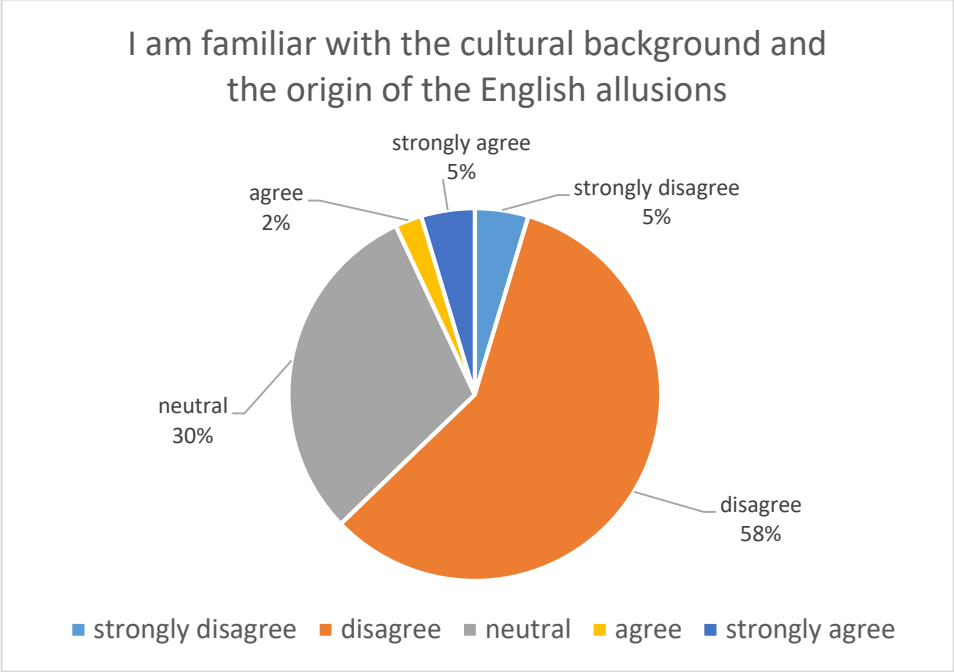

Figure 30 Familiarity with the cultural background and the origin of the English allusions

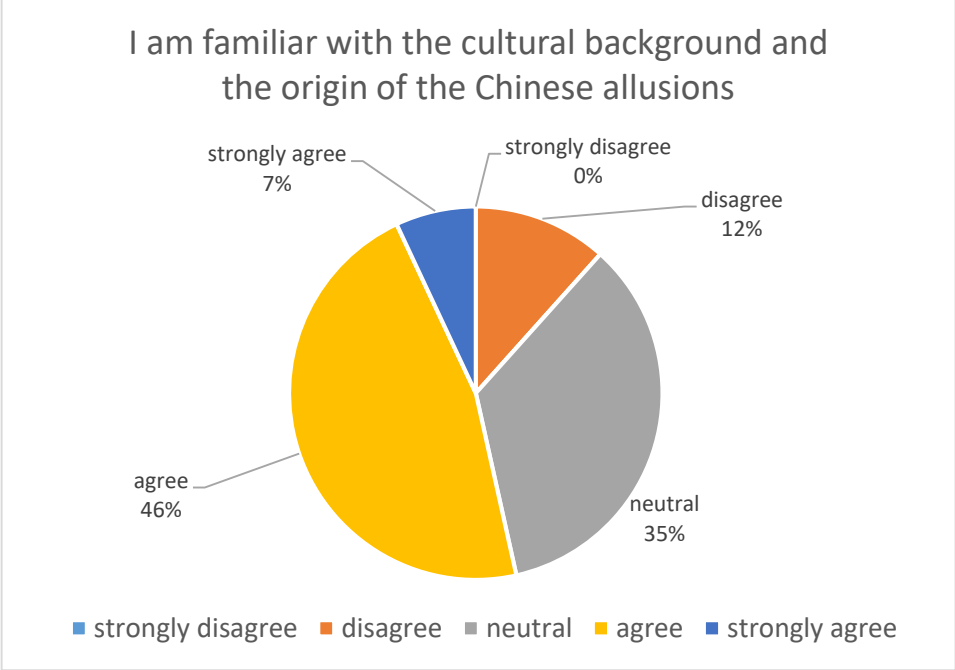

Figure 31 Familiarity with the cultural background and the origin of the Chinese allusions

Although 30% of the participants held a neutral point of view on the first statement, participants who disagreed (63%) have largely surpassed the supporters' figure (7%). Therefore, the majority of the participants are not confident with their cultural knowledge about English allusions. In contrast, the participants are relatively more confident about their knowledge of Chinese allusions, with 53%

stating that they are familiar with the background and the intended meaning of Chinese allusions. However, about 12% of them also felt limited in their total knowledge about L1 allusions.

Difficulty in translating allusion vs non-allusion

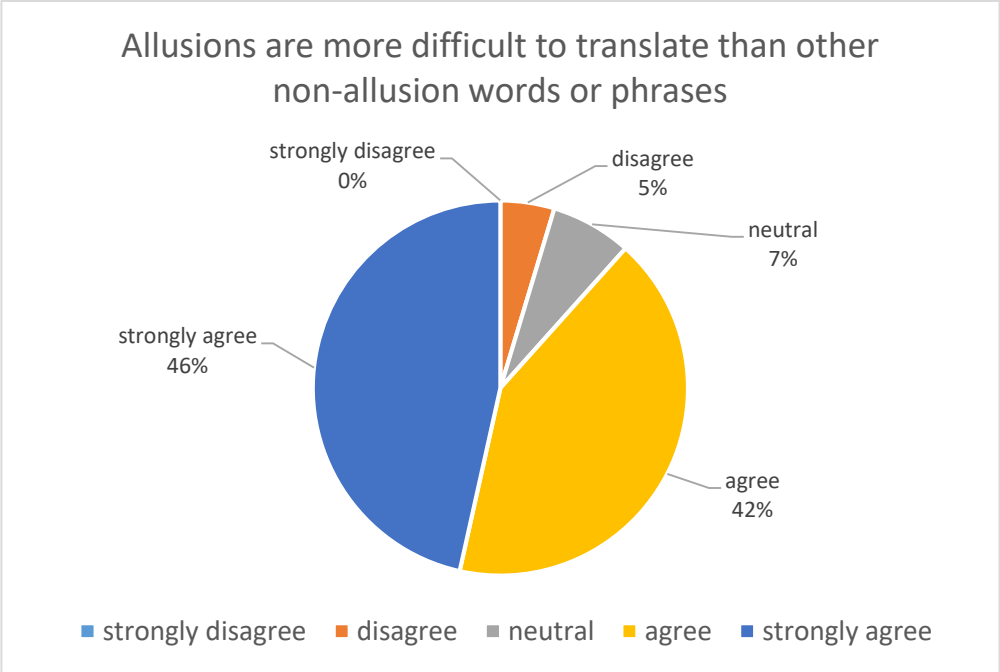

Figure 32 Difficulty to translate allusions vs non-allusions

The first statement asked for general feedback from the participants: whether allusions are more challenging to translate than other non-allusive words. While 7% of the participants held a neutral opinion, the results showed that this statement received overwhelmingly strong support. The majority of participants agreed (42%) or strongly agreed (46%) indicated that translating allusions is more demanding than non-allusions, whereas 5% thought allusions are not more difficult to deal with than non-allusions. The following eye-tracking experiment on cognitive effort is expected to provide more evidence to explain this finding further.

In conclusion, this chapter presented the pre-test and post-test questionnaire findings on the participants' personal profile, their attitudes to directionality and translation of allusions, and their self-estimation of the translation practice and training. The findings are not aimed to answer any research question independently but are gathered as supplementary material to explain the following results. The survey on the personal profile and academic background is expected to explain the relationship between influencing factors and cognitive effort. For instance, the attitudes on the

importance of the ST and TT process, the difficulty between L1 and L2 translation, or the allusion and non-allusion, could complement the eye-tracking and key-logging findings on cognitive efforts. The self-evaluation on the translation competence and relevant training will shed light on the following in-depth retrospective interview to answer the research question.

Chapter 5 Cognitive Effort in the Translation process

5.1 Gazing activities from Eye-tracking experiment

This chapter presents the eye-tracking data from the experimental translation test, dividing into two main parts: the relation between cognitive effort (CE) and directionality; the relation between CE and translation of allusion. Data from the eye-tracking experimental test has been exported from the Tobii Studio software and imported into the SPSS for a series of quantitative analyses.

5.1.1 Cognitive Effort and the Directionality of Translation

This section will analyse the effect of translation direction on the CE during the translation experiment from the overall task time to the eye-tracking metrics. Analysis and discussion in this section aimed to answer the RQ1a: Would there be any difference in the CE allocation in L1 and L2 translation? It will also discuss the effect of directionality on the CE allocation by comparing the related variables from two directions of the translation process. Furthermore, it will look into both ST and TT areas during the translation process to investigate how the CE has been allocated in those areas during the translation process.

5.1.1.1 Total Task Time

Task time was considered the most basic but useful indicator of CE in translation process studies. Both N. Pavlovic and Jensen (2009) and Ferreira et al. (2016) have pointed out that, on average, translation into the foreign language (C-E) required more time than the other way round. Thus it would be necessary to see whether the difference also existed between English and non-European language like Chinese and whether the gap would be more significant given the greater distance from Chinese than the more cognate European languages adopted by the previous researchers.

Paired Samples Statistics

		Mean	Std. Deviation	Std. Error Mean
Pair 1	Tasktime_EC	1720018.16	428826.349	77019.486
	Tasktime_CE	2025829.00	727815.634	130719.547

Paired Samples Test

		Paired Differences					
		Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
Pair 1	Tasktime_EC – Tasktime_CE	-305810.839	489105.045	87845.859	-3.481	30	.002

Table 18 T-test: Total task time in L1 and L2 translation

Group Statistics

	Experience	Mean	Std. Deviation
Tasktime_EC	Undergraduates	1895937.14	509727.482
	Postgraduates	1658194.00	405882.336
Tasktime_CE	Undergraduates	2179924.29	621401.828
	Postgraduates	1966018.55	736641.902

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Tasktime_EC	Equal variances assumed	.521	.477	1.271	27	.215
Tasktime_CE	Equal variances assumed	.021	.885	.692	27	.495

Table 19 T-test: Total task time between Undergraduates and Postgraduates

A paired sample t-test was conducted to evaluate the task time of participants doing translation in each direction. It had been statistically proved that the task time in the E-C (M=1720018.16, SD=428826.349) was significantly shorter than in the C-E (M=2025829.00, SD=727815.634) direction of translation. In terms of different groups of participants, it took slightly more time for the undergraduates than the postgraduates to finish the translation in both directions, although the differences did not reach a significant level (Sig. larger than 0.05 level). It confirmed the result of Pavlovic and Jensen, in which L2 translation takes more time than the L1 translation among the participants.

Correlations

	Pearson Correlation	Sig. (2-tailed)	N
Tasktime_EC & TypingspeedCH	.093	.618	31
Tasktime_CE & TypingspeedEN	-.124	.506	31

Table 20 Correlation test: Task time and typing speed

It would be necessary to check the correlation between the typing speed and the task length to see whether the typing speed would affect the task length and whether a faster typist will finish the translation in a shorter time. The result from the Pearson Correlation test rejected the hypothesis significance exceeding 0.05. Neither the typing speed of Chinese affected the task time of English to Chinese translation nor typing speed of English affected the task length of Chinese to English in all populations

5.1.1.2 TFD and TFC as Cognitive Indicators: from Macro AOIs

Two eye-tracking metrics are reported to account for the CE in the translation process to generate comprehensive analysis, namely Total Fixation Duration (TFD) and Total Fixation Count (TFC). The data of 31 participants and 48 AOIs for all 12 texts per person in both languages have been examined to conduct the analysis. The heat map extracted from the Tobii Studio software helps to give an initial impression of this issue. According to visual activity, heat maps show both fixation count and fixation duration located in the Macro AOIs from a graphic perspective. Areas with more intense visual activities (higher fixation count and longer duration) are shown in red, orange, yellow or green as visual activity decreases in intensity (see Figure 32).

The first analysis investigated the gazing activities on the whole screen in the two directions of translation through the AOI named “full-screen”. Figures 32 and 33 outlined the intensity of gazing activity of 6 sentences in two directions, respectively. It could be observed that the gazing activities might be more intense in the L2 translation (C-E) than the L1 translation (E-C). The hypothesis is: More CE has been devoted to L2 translation (C-E) than L1 translation (E-C).

Figure 33 Screenshot: Heat map

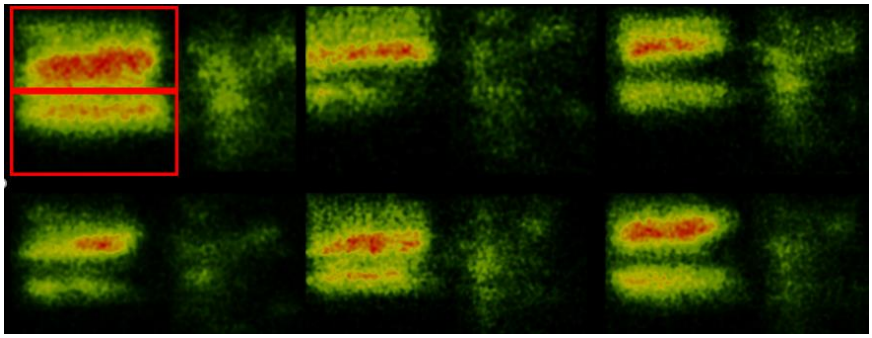

Figure 34 Group of Heat maps of E-C translation

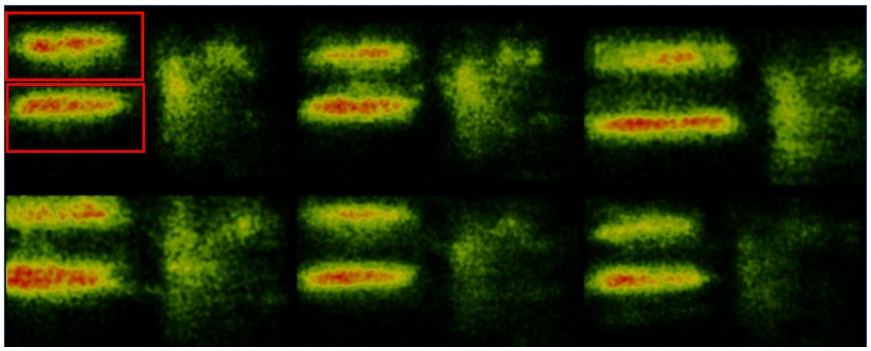

Figure 35 Group of Heat maps of C-E translation

Figure 35 compared the values of CE indicators between E-C translation and C-E translation full-screen AOIs as the numeric representation of the heat maps. The TFD and TFC were slightly shorter for the full-screen AOIs combined in the E-C direction than those in the C-E direction.

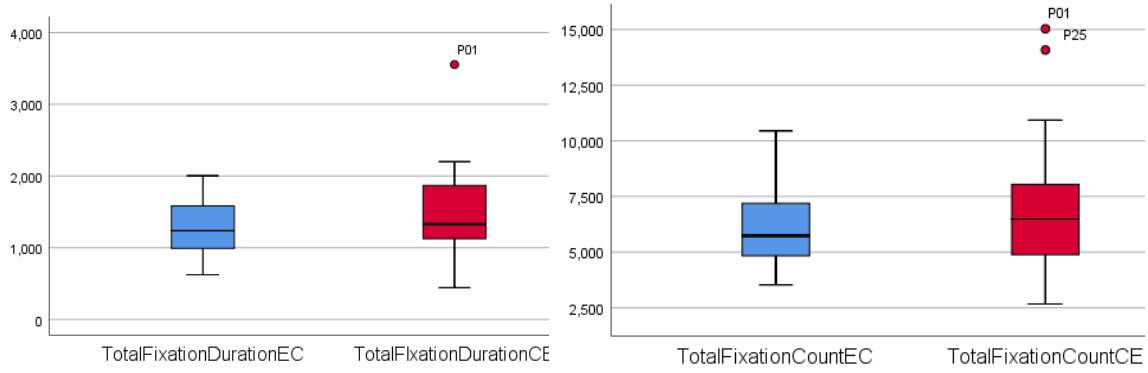

Figure 36 Boxplot: TFD and TFC in two directions

Paired Samples Statistics

		Mean	Std. Deviation	Std. Error Mean
Pair 1	TotalFixationDurationEC	1263.878	391.849	70.378
	TotalFIxationDurationCE	1467.463	616.466	110.721
Pair 2	TotalFixationCountEC	6199.355	1801.613	323.579
	TotalFIxationCountCE	7071.452	2878.160	516.933

		Paired Differences				
		Mean	Std. Deviation	Std. Error Mean	t	Sig. (2-tailed)
Pair 1	TotalFixationDurationEC - TotalFIxationDurationCE	-203.584	409.837	73.609	-2.766	.010
Pair 2	TotalFixationCountEC - TotalFIxationCountCE	-872.097	2111.365	379.212	-2.300	.029

Table 21 T-test: TFD and TFC in two directions

The paired sample t-test presented the differences between the two metrics in both directions to confirm the result statistically. The results, as expected, confirmed the hypothesis that there are significant differences between E-C and C-E in TFD and TFC on full screen (Sig. =0.01/0.029). On

average, the TFD in the E-C translation (M=1263.878, SD=391.849) was about 14% shorter than the C-E translation (M=1467.463, SD=616.466). The TFC was around 12% fewer in the E-C translation than the C-E translation. Therefore, it could be concluded that the hypothesis that L2 translation required more CE than the L1 translation has been confirmed by both eye-tracking metrics and task length between the Chinese and English translation among Chinese translators.

The conclusion is similar to Chang (2009), who received the same conclusion from testing fixation count, fixation frequency and task time on English and Chinese non-technical text translation. The same hypothesis was partially confirmed in N. Pavlovic and Jensen (2009) and not confirmed in Ferreira et al. (2016). The discrepancy could be due to the translators' experience. As mentioned, N. Pavlovic and Jensen (2009) recruited professional Danish translators, and Ferreira had Spanish professional translators, while in this study, only Chinese undergraduate and postgraduate translators will be considered in the analysis. The background, language proficiency, and translation experience may contribute to different conclusions as participants might have different beliefs in translation practice about which part of translation is more demanding. In addition, the insufficient amount of only 4 participants in Ferreira's study should not be overlooked as it may lead to inadequate conclusions.

The second analysis focused on the comparison between ST and TT areas in each direction. In Figure 33, the areas that need to be explored have been outlined in red, where the upper section is the ST area and the lower part is the TT area. In the E-C translation, it could be observed that through comparing the ST areas and TT areas of the six heat maps, the lower part, TT areas, required less intense CE than the ST areas in all the six maps. Therefore, it hypotheses that more CE is required processing the source text (ST) than the target text (TT) in L1 translation (English-Chinese). Marked differences could be seen from the boxplot below in which both two variables, fixation duration and fixation count, are higher in ST than TT area in English to Chinese translation.

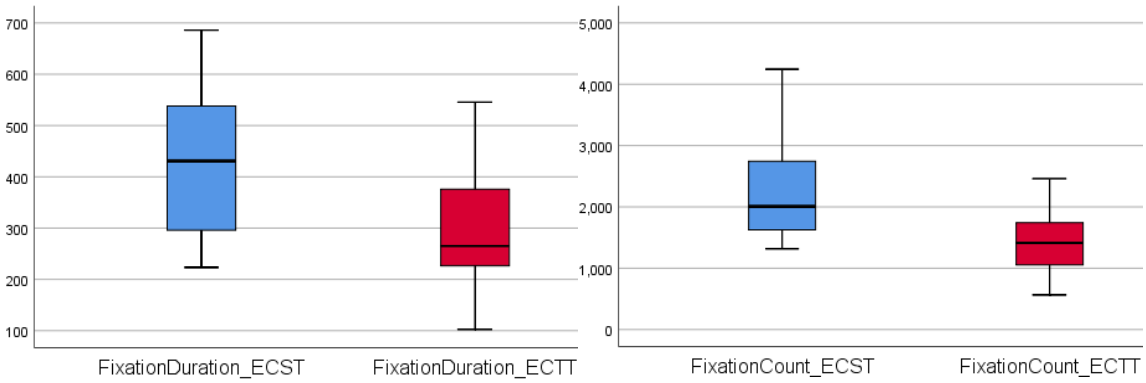

Figure 37 Boxplot: TFD and TFC between ST and TT in L1 translation

Paired Samples Statistics

		Mean	Std. Deviation	Std. Error Mean
Pair 1	FixationDuration _ECST	421.818	136.655	24.544
	FixationDuration _ECTT	299.779	116.833	20.984
Pair 2	FixationCount _ECST	2191.226	696.155	125.033
	FixationCount_ECTT	1389.774	442.913	79.550

Paired Samples Test

		Paired Differences			t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean		
Pair 1	FixationDuration _ECST - FixationDuration _ECTT	122.039	149.600	26.86899	4.542	.000
Pair 2	FixationCount_ ECST - FixationCount_ ECTT	801.452	725.941	130.38289	6.147	.000

Table 22 T-test: TFD and TFC between ST and TT in L1 translation

The paired sample t-test confirmed the hypothesis by having the two Sig. Value reaching 0.01 level, indicating that the ST area requires more CE than the TT area in English to Chinese translation. On average, the TFD allocated in the ST area (M=421.818, SD=136.655) was about 29% more than in the TT area (M=299.779, SD=116.833) and the total fixation count was around 36.5% more. Therefore, we could conclude that in L1 translation, Chinese translators tend to devote more CE to comprehending the ST than producing the TT area. The finding is not surprising since the ST in the L1 translation is the participants' foreign language; participants tend to direct more attention and CE in comprehending the text, especially for the literary translation related to allusion. Due to the nature of allusion as an intertextual and culture-specific element, it has intended meaning and might be more demanding to deal with when the translator is an outsider of the SC where the allusion comes from. It is also in agreement with the Importance rank in Figure 25, where participants considered familiarity with the SC the most critical factor influencing the translation.

In Chinese to English translation, as shown in Figure 34, the differences between CE allocation in the ST and TT area were not as distinct as those in the other direction. The lower part, the TT area, contained more red dots than the upper one in five out of six heat maps, while the first one did not show many differences. It is anticipated that Chinese translators invested more CE in TT over ST in L2 translation (Chinese-English). The boxplot presented the same trend as the red one, representing the TT area metrics higher than the other blue one, the ST area.

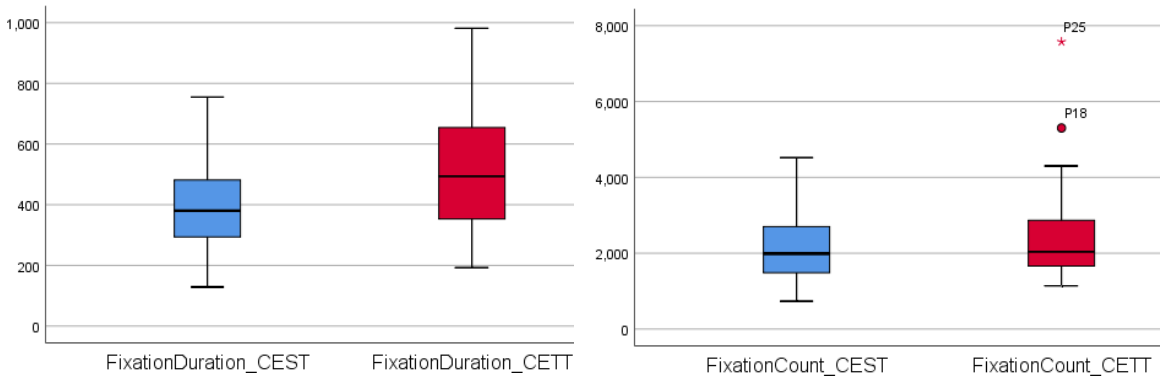

Figure 38 Boxplot: TFD and TFC between ST and TT in L2 translation

Paired Samples Statistics

		Mean	Std. Deviation	Std. Error Mean
Pair 1	FixationDuration_ CEST	384.7793	148.75218	27.15831
	FixationDuration_ CETT	528.4743	194.75614	35.55744
Pair 2	FixationCount_ CEST	2014.1000	737.11031	134.57731
	FixationCount_ CETT	2449.4333	1341.02523	244.83659

Paired Samples Test

		Paired Differences			t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean		
Pair 1	FixationDuration_ CEST - FixationDuration_ CETT	-143.69500	217.19451	39.65411	-3.624	.001
Pair 2	FixationCount_ CEST - FixationCount_ CETT	-435.33333	1226.28976	223.88885	-1.944	.062

Table 23 T-test: TFD and TFC between ST and TT in L2 translation

It is surprising that although both the metrics show the trend that the CE allocation in TT outweighed the one in the ST area, only TFD (M=-143.695, p=.001) reached a significant level of 0.05. As the Sig. of TFC (M=-435.33, p=.062) was larger than 0.05, the hypothesis was not confirmed in the Chinese to English translation. It could be concluded that Chinese translators did not necessarily devote more CE in the TT area during L2 translation compared to the ST area. In other words, when translating from Chinese to English, the Chinese translators did not feel the production of TT to be more demanding than the comprehension of ST. The result differed from the expectation as in Chinese to English translation, the TT is in the non-native language of the participant and therefore, it was expected to be more challenging to process and cost more CE. It is potentially due to the emphasis on the SC and the intended meaning, as suggested in Figure 25.

This finding provides evidence in favour of the statement of Ferreira et al. (2016), who believed that translators seem more concerned with understanding the source text, regardless of the language.

However, this statement was completely the opposite of the conclusion made by N. Pavlovic and Jensen (2009), demonstrating that translators direct more visual attention to the target text. Despite the different language pairs and participant numbers, the difference between the present thesis and Pavlovic's research was the text type of the translation. This research adopts the literary translation that contains allusion entirely different from the non-allusive text adopted by the other research. The translation of the literary text that contains allusions is anticipated to require more complex cognitive processing than non-allusive words since the allusion, as an intertextual element, is closely linked to its referent. Only by recognising and comprehending the original might the translators understand the allusion's hidden meaning. Therefore, in L1 translation, when the allusions are in a foreign language, the translators devote more work to understanding the ST fully, and thus the process of comprehension might require more CE. While in L2 translation in which translators were assumed to devote more CE in the TT area, the translators are not significantly allocating less CE to comprehend the allusion than producing the TT, indicating that even in their L1, the comprehension of allusion is also demanding and vital for the translation process.

The third analysis regarding the relation of CE and directionality discussed the attention paid to the external resources in English to Chinese and Chinese to English translation. It compared the CE allocated in the browser (red frame) in six translation tasks in each direction. The hypothesis was that CE invested in the external resources in L2 translation (Chinese-English) are higher than in L1 translation (English-Chinese).

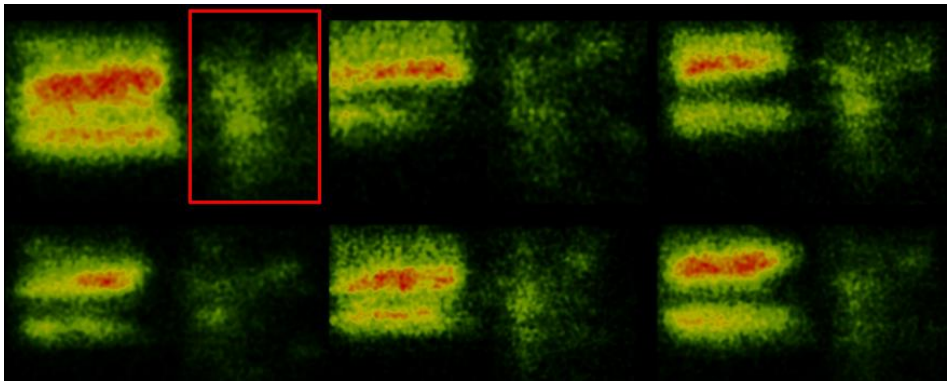

Figure 39 Group of Heat map of E-C translation with External resources outlined

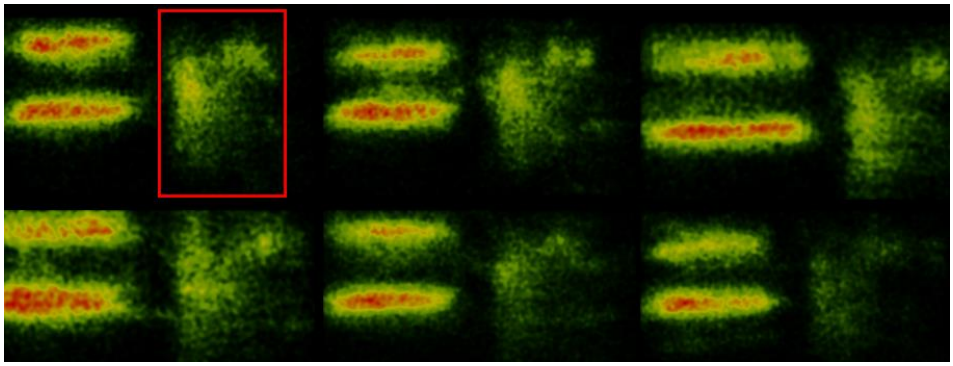

Figure 40 Group of Heat map of C-E translation with External resources outlined

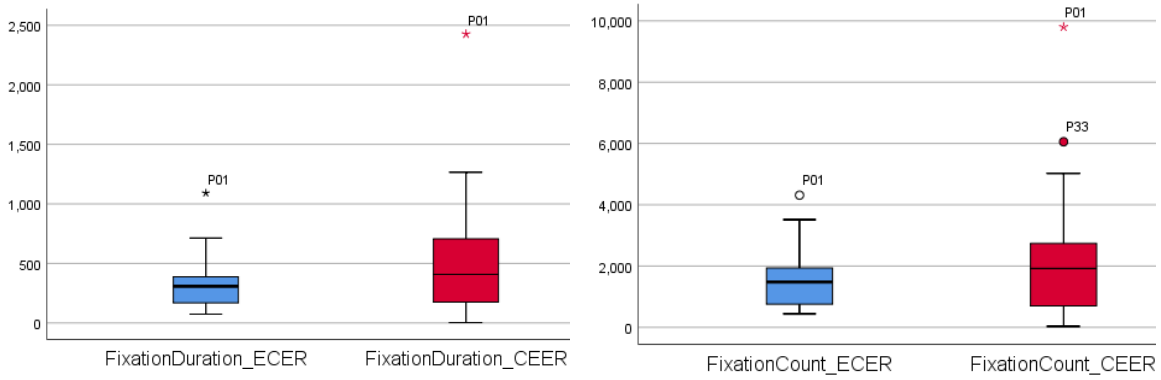

Figure 41 Boxplot: TFD and TFC on External resources in both directions

Paired Samples Statistics

		Mean	Std. Deviation	Std. Error Mean
Pair 1	FixationDuration_ ECER	340.934	220.315	39.570
	FixationDuration_ CEER	522.563	497.767	89.401
Pair 2	FixationCount_ ECER	1528.645	886.193	159.165
	FixationCount_ CEER	2227.677	2026.872	364.037

Paired Samples Test

		Paired Differences			t	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean		
Pair 1	FixationDuration_ ECER - FixationDuration_ CEER	-181.628	336.212	60.386	-3.008	.005
Pair 2	FixationCount_ ECER - FixationCount_ CEER	-699.032	1452.352	260.850	-2.680	.012

Table 24 T-test: TFD and TFC on External resources in both directions

The boxplot has presented a trend of CE in C-E translation outweigh those in E-C translation. The third hypothesis that the translator would attribute more CE to the external resources in L2 translation than in L1 translation has been statistically confirmed. The TFD allocated in the ER area (M=522.563, SD=497.767) on average was about 35% more than in C-E translation than E-C translation (M=340.934, SD=220.315), and the TFC in C-E translation (M=2227.677, SD=2026.872) was 31.4%

higher than in E-C translation (M=1528.645, SD=886.193). The conclusion conflicted with the findings of Ferreira et al. (2016), in which most of the participants spent a longer fixation time in the Browser during L1 translation. Again, despite the small number of participants in her work, it is reasonably assumed that translating sentences that contain allusion demand more effort than science text adopted by Ferreira et al. (2016), even in their first language. It might be the case that translators devoted effort to finding the corresponding English expression in TT production and comprehending the Chinese ST with the help of external resources in L2 translation. It is expected that more explanation for this situation could be found through the qualitative investigation of the participants' verbal reports.

5.1.1.3 Cognitive Efforts and the Effects from Related Variables

Two kinds of factors need to be defined before the analysis in the GLMM as fixed variables and co-variables. Fixed variables refer to the categorical variables with a fixed number of levels that may recur throughout a data set (Balling, 2008), like Experience (undergrads, postgrads) or Skopos (leisure, educational). Co-variables are continuous or scale variables that may affect the indicators. For details of variables description, see below:

	Variables name	Description
Fixed factors	Translation experience	undergraduates (coded as 0) postgraduates (coded as 1)
	Skopos	leisure reading (coded as 1) translating for culture or language learning (coded as 2)
	Allusion type	proper name (coded as 1) key-phrase (coded as 2)
	Sentence words	The word counts of the underlined sentence, which the participants were required to translate.
	Paragraph words	The total word counts of the paragraphs that contain the underlined sentences.
	Allusion Familiarity	the familiarity of allusions in the L1 environment
	Typing speed	The typing speeds of participants
	External resource visit count	The sum of the number of times that the gaze enters and exits a target AOI.

Random effect	Participant ID	A random effect factor since the participants were recruited randomly from a general population of translators.
	Allusion ID	Corresponding allusion AOIs/contrast AOIs embedded within the underlined sentences, which the participants were required to translate. Allusion ID is a random effect since all the allusions are chosen from natural texts, varied in length, familiarity factors. The same variability is applied in the Contrast AOIs.

Table 25 GLMM: List of Variables for the GLMM Macro AOIs

5.1.1.3.1 CE in the External resources AOI

The analysis starts from the external area where the participants can use a browser (internet) to look up all the information they need during the translation. The GLMM model was applied in L1 and L2 translation, respectively, using the categorical variable Translation Direction as a filter to select cases. The GLMM analysis shows what variables may affect the allocation of CE, indicated by total fixation duration (TFD) and total fixation count (TFC) and examine whether there is any difference between the variables' effect due to the directionality. To ensure the validity and credibility of the conclusion, only when the variables have significant effects on both eye-metrics will they be considered the factors that may affect the CE in the external resource searching process. All the variables that contribute to the GLMM for CE in external resources AOI are shown as below:

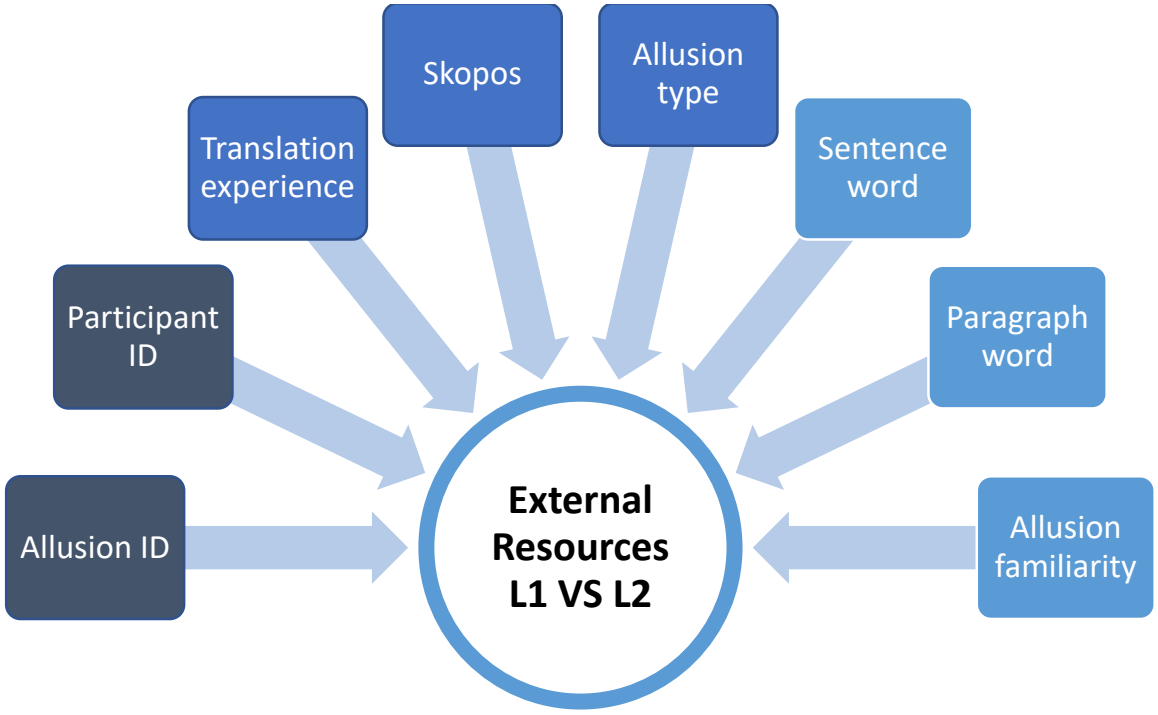

Figure 42 GLMM model for External resources AOI

Both the histogram and the normality test show that both eye metrics are not normally distributed but positively skewed. Therefore, Gamma with log link will be adopted to analyse the total fixation duration as the target or dependent variables. It is more suitable for the positive skewed distributed data, and the Poisson log-linear model is applied for fixation count as it works better with the count variables.

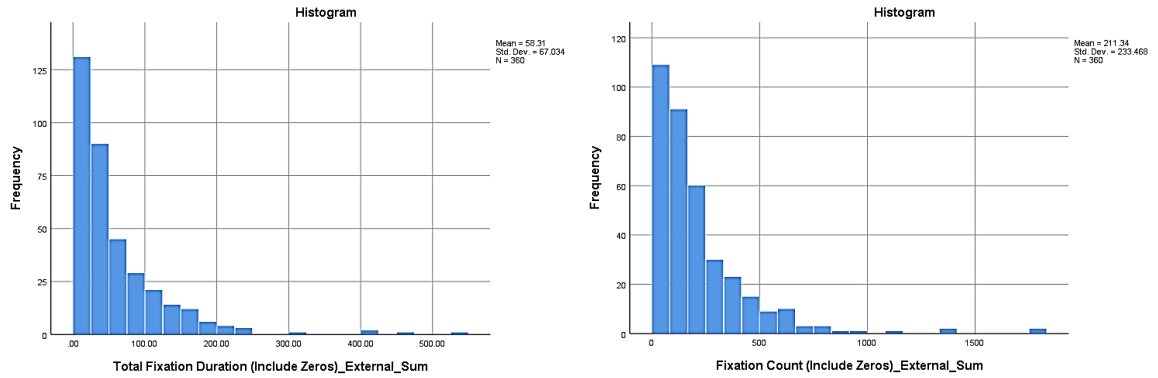

Figure 43 Data distribution for the CE indicators in ER

Table 24 summarises the test for effects in the GLMM analysis in two directions, and it can be confirmed that the variables that influence the CE in the external resources area are slightly different in the two directions. In general, compared to the TFD, the TFC is more sensitive to the variables' effect in both directions as many more variables are significantly influential to the TFC than to the TFD ($p<.05$). Therefore, it can be confidently concluded that in L1 translation, sentence word count

(p=.029; p=.000), the allusion type (p=.009; p=.000) and the allusion familiarity (p=.004; p=.000) would affect the CE in the external searching process while in L2 translation, it is the translation experiences of the participants (p=.012; p=.031) and the allusion familiarity (p=.020; p=.000) that affect the CE in the consulting process.

Directionality	L1 translation					L2 translation				
Eye-metrics	**TFD**		**TFC**			**TFD**		**TFC**		
Source	F	Sig.	F	Sig.		F	Sig.	F	Sig.	
Corrected Model	6.57	.000	391.09	.000		2.76	.004	148.81	**.000**	
Experiences_type	3.62	.059	3.59	.060		6.43	**.012**	4.73	**.031**	√
Skopos_type	1.01	.317	81.64	**.000**		.22	.643	82.53	**.000**	
Sentenceword	4.87	**.029**	569.13	**.000**	√	.46	.501	149.99	**.000**	
Paragraphword	2.34	.128	101.38	**.000**		2.50	.116	54.50	**.000**	
Allusion_type	7.03	**.009**	438.01	**.000**	√	3.69	.057	309.38	**.000**	
Allusion Familiarity	8.33	**.004**	263.23	**.000**	√	5.57	**.020**	798.79	**.000**	√

Table 26 GLMM summary in L1 and L2 translation: External resources

Significant variables to the External searching in both directions

The GLMM test also provides detailed analysis and shows how the fixed factors and co-variance influence TFD and TFC in the external searching. The Coefficient values show how strong the effects are. For a continuous field, the coefficient is the expected change for a unit increase in the value of the continuous field: positive coefficient equivalent to a positive relationship between the factors and outcome and vice versa.

Allusion familiarity

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion Familiarity	**-.21**	**.004**	**-.16**	**.000**	**-.30**	**.020**	**-.36**	**.000**

Table 27 Eye tracking: Allusion familiarity in ER AOI

Allusion familiarity represents how familiar the native speakers of the SL are with the allusion. Table 25 witnessed a significant negative correlation (B=-.21, B=-.16; B=-.30, B=-.36) between the allusion familiarity and CE, indicated by TFD and TFC, in two directions. The more familiar the allusion in the SL and SC, the fewer CE participants allocate in the ER area, or they are less likely to consult external resources. Two directions share the same conclusion in the variables, and the result also indicates that the allusion did impact the consulting process in translation.

Significant variables to the External searching in L1 translation

The value 0 in coefficient indicates the corresponding categorical factor has been treated as a comparison base and a larger Coefficient (compared to the base 0) indicated longer TFD or a higher TFC. The Sig. values in Table 26 differ slightly from those in Table 25 above regarding the categorical variables, showing significant differences between this base factor and other categorical factors.

Allusion type

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Proper name	.33	**.009**	**.32**	**.000**	.46	.057	**.44**	**.000**
Key-phrase	0	**.**	**0**[b]	**.**	0	.	**0**[b]	**.**

Table 28 Eye-tracking: Allusion type in ER AOI

Twelve sentences have been categorised into two groups according to the type of allusion they contained based on Leppihalme's (1997) definition of allusion types: PN (Type 1) and KP allusion (Type 2). As suggested by the table above, Type 1 received more TFD (B=.33; B=.46) and TFC (B=.32; B=.44) than Type 2 in both directions, although the TFD (p=.057) failed to reach the significant level in L2 translation. The results indicate that participants tend to allocate more time and a higher number of fixations in the external consulting process when translating sentences that contain PN allusions (B=.33) than those containing KP allusions (B=.00) in L1 translation.

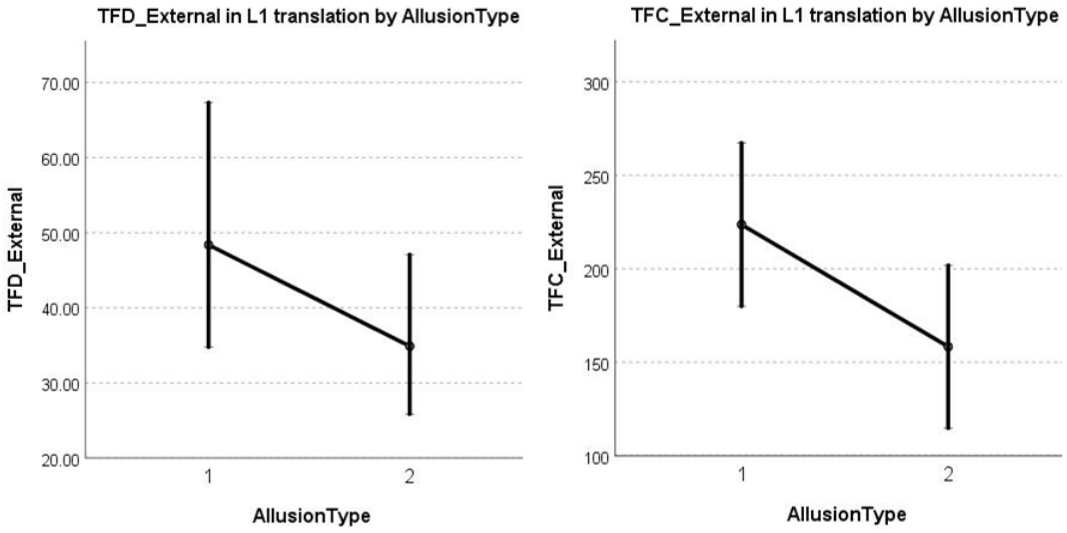

Figure 44 TFD and TFC in L1 translation ER area by Allusion type

In L1 translation, it can be confirmed that more CE for external resources consulting was allocated in the area to translate sentences containing an English PN allusion than an English KP as two eye-metrics reached a significant level (p=.009; p=.000). It is reasonably inferred that when translating

texts with PN allusions, the participants operate more searching for solutions in external resources than those with KP allusions. Also, when dealing with Chinese to English translation, TFC shows a significant difference between translation containing Chinese PN allusions with translations containing Chinese KP allusions, but no significant level has been reached for the TFD (p=.057). Therefore, a definite conclusion on the impact of allusion type on CE in the external consulting process cannot be confirmed.

The discrepancy between the two directions is probably due to the nature of the allusion. Most PNs can be easily identified through linguistic characteristics, such as capital letters, while most KP allusions are similar to common phrases to the translators unaware of their meaning. Therefore, it could be more straightforward for the translators, especially the novice or trainee translators, to identify the PN allusion as a culture-reference in L1 translation and look to external resources for clarification; whilst they might miss the allusive content of the KP allusions and translate the allusion directly without consulting any external resource.

Sentence length

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Sentence word	.009	**.029**	.013	**.000**	.011	.501	.021	**.000**

Table 29 Eye-tracking: Sentence length in ER AOI

It is not surprising that the ST length has a significant and positive correlation with both the TFD (B=.009/p=.029) and TFC (B=.013/p=.000) in L1 translation. It is evident that the longer the underlined sentence is, the more CE required to decontextualise the ST in their L2, which might involve the external consulting process. Consequently, it will significantly raise the number of fixations and the fixation duration. However, the same trend was not found in the L2 translation. The finding is understandable since in L2 translation, the STs are in translators' first language, and longer ST did not necessarily result in more external searching behaviour, which allocated CE in the ER area.

Significant variables to the External searching in L2 translation

Experience type

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Undergraduate	.63	.059	.52	.060	1.50	**.012**	1.32	**.031**
Postgraduate	0		0		0		0	

Table 30 Eye-tracking: Experience type in the ER AOI

As shown in Table 28, the translation experience of the participants has no significant effect on both the TFD (p=.059) and TFC (p=.060) during the external searching behaviour in the L1 translation. However, it has a significant effect on the CE on the searching behaviour in the L2 translation. In L2 translation, Chinese to English, the coefficient value (B=.96) for undergraduates (type=0) outweighed the other group (B=0), postgraduates (type=1), showing the undergraduate group has longer TFD and more TFC during the external consulting.

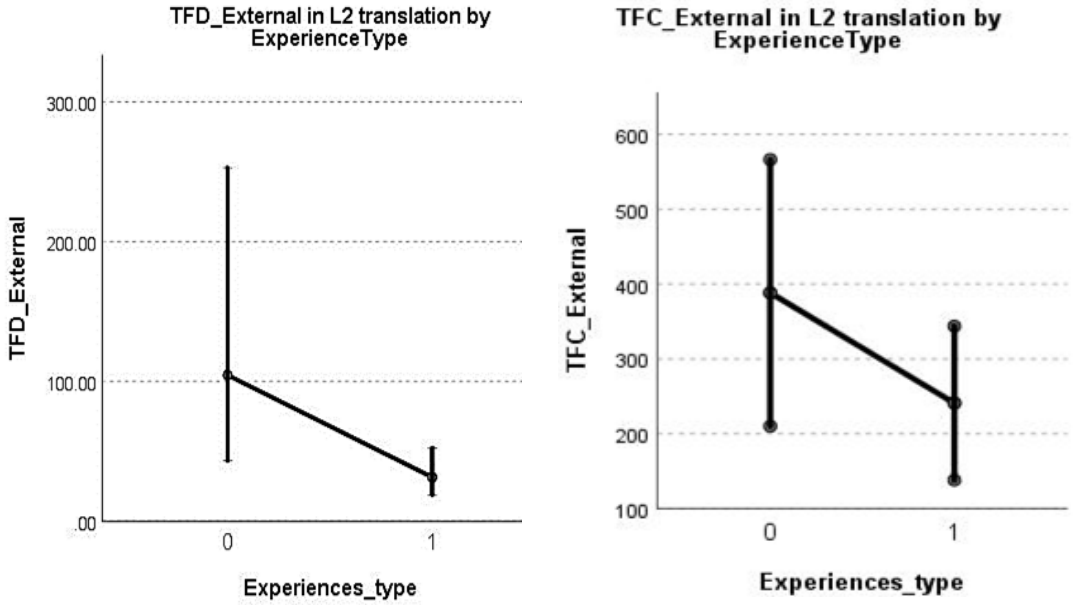

Figure 45 TFD and TFC in L2 translation ER area by Experience type

Therefore, it can be concluded that the postgraduates are more efficient in external resources consulting than the undergraduate students and thus allocate less TFD and TFC to find the solution to translation problems with less CE demanded in L2 translation. However, in L1 translation, no significant level has been achieved between the groups, but it indicated that the undergraduates demand more CE than the postgraduates when consulting the external resources as indicated by the coefficient value.

It is reasonable to assume that participants' efficiency in external resource searching is related to their translation experience, with more experienced participants being more efficient in using resources than less experienced participants. One of the assumptions might be that postgraduates have undertaken more L2 translation and thus developed more effective external searching strategies and allocated less CE. Given that no significant difference was found in the years of translation training between the participants' groups in the pre-test questionnaire, and the undergraduates tend to have a long history of English language learning than the postgraduates, it is less like for the language competence to result in the difference. However, it should be notable that the number of

participants in each group witnesses a relatively large gap, with 100 postgraduates and 22 undergraduates involved in the pre-test questionnaire. Therefore, in the discussion of the findings, the limitation on the recruitment of participants should not be neglected.

Insignificant Variables to the External searching

Skopos type

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Skopos_type =1	.09	.317	**.11**	**.000**	.05	.643	**.09**	**.000**
Skopos_type =2	0	.	**0**[b]	**.**	0	.	**0**[b]	**.**

Table 31 Eye-tracking: Skopos type in ER AOI

The result suggested that the translation Skopoi, the purpose and target reader, contributes to the TFC in the external consulting process with both Sig. value reached 0.01 level (p=.00). To be specific, when translating for leisure reading for the reader who has no or little knowledge about the SC and SL (type 1), the participants tend to have more fixation in the external resource area than translating for an educational purpose for readers who are willing to develop their knowledge of the SC and SL (type 2). In translation, the translator devotes extra effort to providing further information to convey the meaning to the reader unfamiliar with the SC and SL, and therefore this might trigger the increase in the number of fixations in the external resource area. However, it should also be pointed out that although the Skopoi significantly influences the TFC, the effect on the TFD was not confirmed significantly. Therefore, it cannot be concluded that the Skopoi type has a significant impact on the CE of the participants during the external resources consulting process in either direction.

Paragraph length

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Paragraph word	-.01	.128	-.01	**.000**	.01	.116	.00	**.000**

Table 32 Eye-tracking: Paragraph length in ER AOI

An unexpected phenomenon was found in the paragraph length. In L1 translation, the paragraph length, which is the length of context around the ST, presents a slightly negative effect (B=-.01) on the TFD and TFC in the external consulting process. However, in L2 translation, the trend is positive (B=.01) for the TFD, and no relationship is found for the TFC (B=.00). In other words, in L1 translation,

the longer the English context for the sentence to be translated, the fewer the fixations are allocated in the external resource area.

5.1.1.3.2 CE in the ST + TT AOI

T-test confirmed that the translation direction has a significant impact on the cognitive effort allocated in the ST and TT area, and the following GLMM aims to explore the other variables that may influence the cognitive effort in the ST+TT area and whether there is a difference in two translation directions. Figure 45 outline the target variables and all the related and potential factors tested, and the histogram distribution of the two target variables suggested that both the TFD and TFC in the ST and TT area are positive-skewed. Therefore, Gamma regression and the Poisson log-linear distribution are adopted to analyse the target variables, respectively.

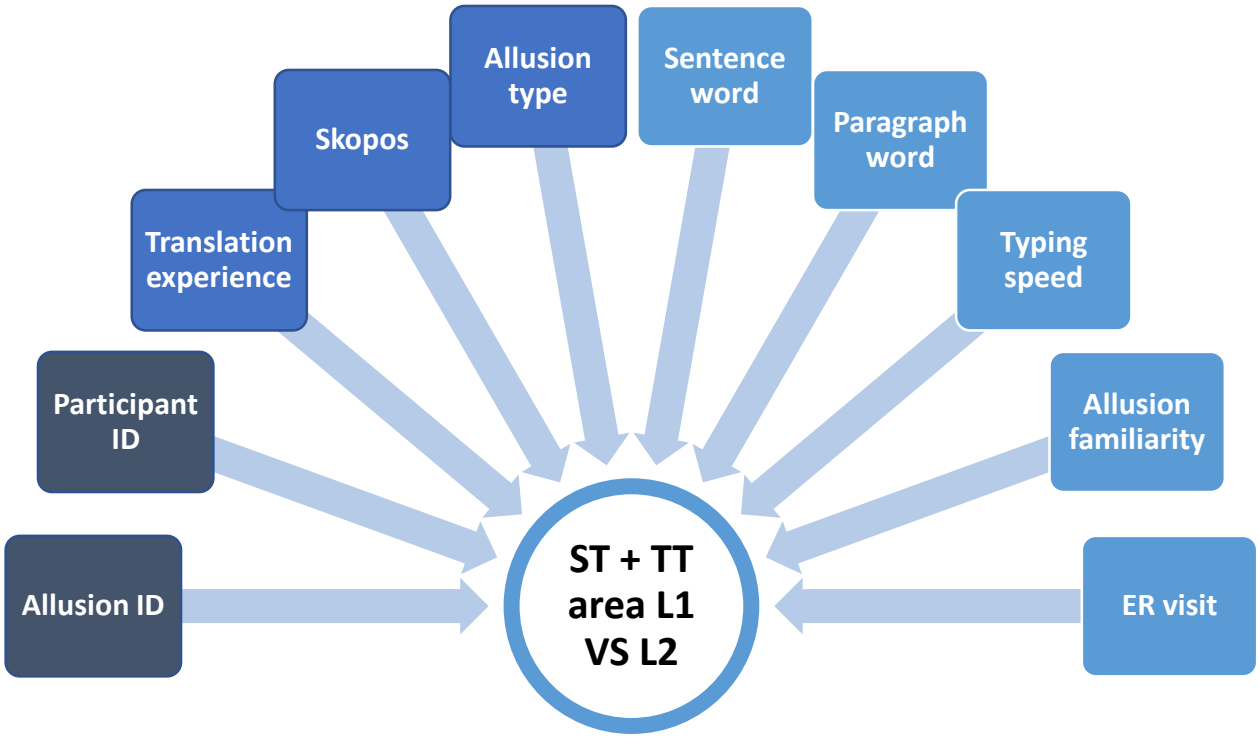

Figure 46 GLMM model for ST+TT AOI

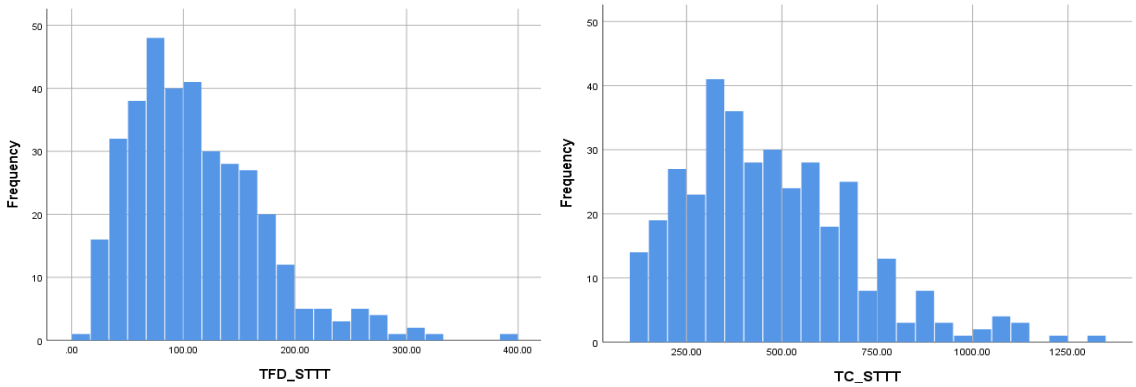

Figure 47 Data distribution for the CE indicators in

Table 31 summarises the correlations between the factors and the target variables. Similarities and differences among the factors to the target, TFD and TFC, have been found in two directions of translation. Skopos type, sentence word count, and visit count to external resources all reached a significant level in both directions of translation, indicating those factors significantly influence the CE in E-C and C-E translation. On the other hand, the experience type of the participants rejects the correlation to the CE, meaning the participants' translation experience has no relation to the allocation of CE during the translation process in two directions. Meanwhile, paragraph word count and allusion type correlate to the CE only in L1 translation.

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Source	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Corrected Model	40.85	.000	1650.35	.000	13.05	.000	354.48	.000
Experiences_type	.55	.459	.31	.576	.58	.449	3.49	.064
Skopos_type	4.78	**.030**	245.99	**.000**	10.16	**.002**	240.13	**.000**
Sentence word	126.26	**.000**	4930.52	**.000**	16.12	**.000**	410.47	**.000**
Paragraph word	26.33	**.000**	742.98	**.000**	.56	.458	11.93	**.001**
Typing Speed	3.65	.058	62.02	**.000**	.17	.679	.04	.840
Allusion_type	4.40	**.038**	68.25	**.000**	1.70	.194	29.85	**.000**
Allusion Familiarity	.54	.464	19.21	**.000**	.401	.525	1.19	.277
ER Visit	23.61	**.000**	225.93	**.000**	26.85	**.000**	839.20	**.000**

Table 33 GLMM summary in L1 and L2 translation: ST and TT area

Significant Variables to the ST+TT AOI in both directions

Skopos type

Directionality	**L1 translation**		**L2 translation**	
Eye-metrics	**TFD**	**TFC**	**TFD**	**TFC**

Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Skopos_type =1	.11	**.030**	.11	**.000**	.13	**.002**	.11	**.000**
Skopos_type =2	0[b]	.	0[b]	.	0[b]	.	0[b]	.

Table 34 Eye-tracking: Skopos type in ST+TT AOI

The statistic shows that the Skopos type significantly affects the CE, both in TFD and TFC (p<.05). The coefficient for Skopos type 1 (for leisure reading) is higher than Skopos type 2 (for educational purposes) (B=.00) in TFD (B=.11; B=.13) and TFC in both directions (B=.11; B=.11) and reached a significant level (P<.05). It can be concluded that in both directions of translation, the translation for leisure reading for people who have little access to the SL and SC required more CE in the translation process than translation for educational purposes to "insider" readers.

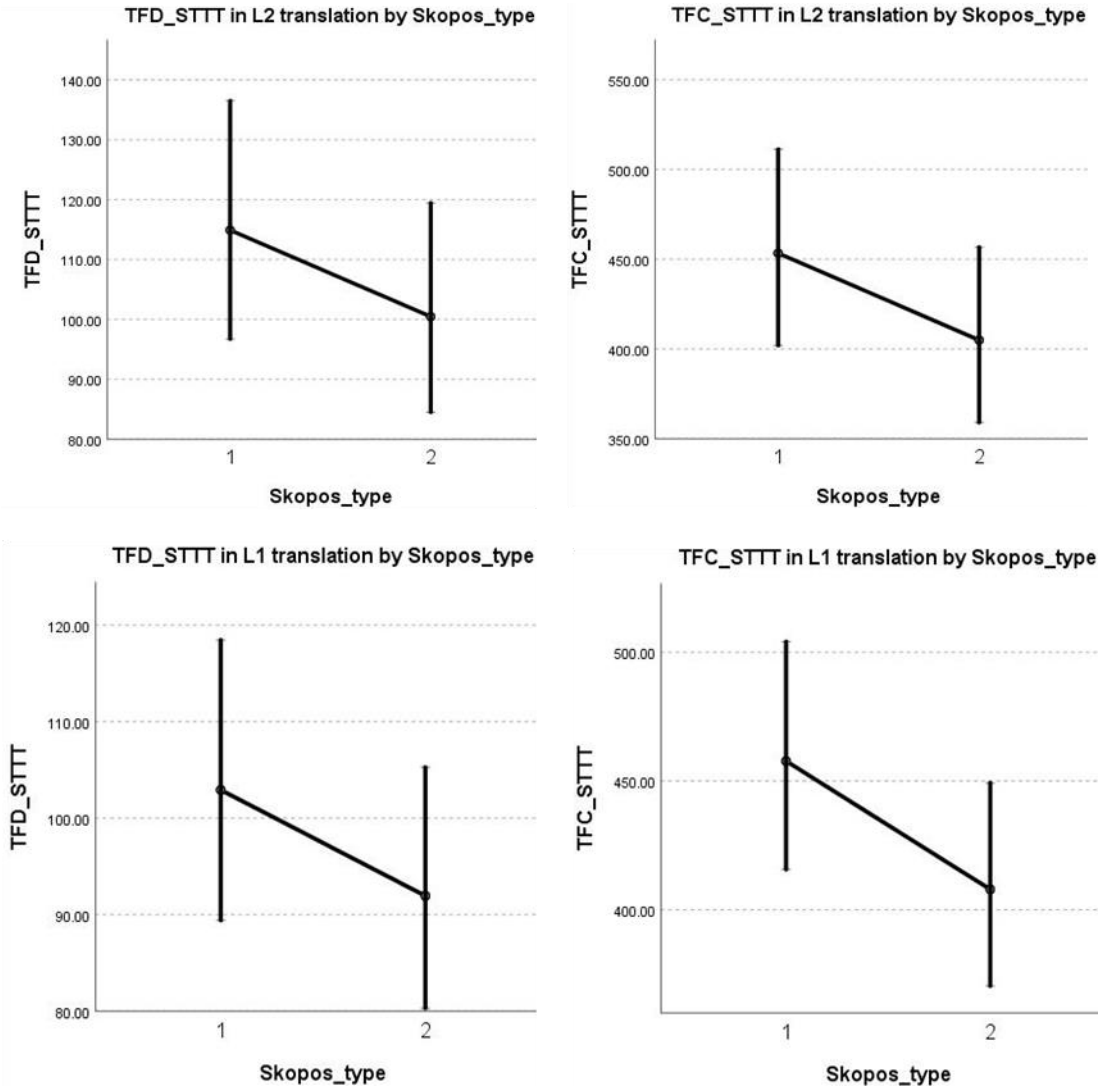

Figure 48 TFD and TFC in both directions ST+TT AOI by Skopos type

As in the analysis on external resources, translating for the outsider reader (Type 1) might require further explanation than translating for the readers who have a certain level of understanding of the source background (Type 2). Responding to the needs of the outsider readers might require translators to adopt different translation strategies, thus causing the increasing length and number of fixation. The qualitative analysis in the following section on the translation strategies is expected to give further support to this hypothesis.

Sentence length

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Sentence word	.03	**.000**	.03	**.000**	.03	**.000**	.03	**.000**

Table 35 Eye-tracking: Sentence length in ST+TT AOI

The sentence length (ST length) is significant to the allocation of CE in the ST and TT area in both directions of translation, as proved by two eye-metrics (p=.00). Furthermore, the coefficient indicated that the correlation between the length of ST and the CE in the ST and TT area is positive (B=.03), which means the more words there are within the underlined sentence to be translated, the more CE is required to translate it.

Visits to External resources

Directionality	L1 translation				L2 translation			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
VC_External	.01	**.000**	.01	**.000**	.01	**.000**	.01	**.000**

Table 36 Eye-tracking: Visits to External resources in ST+TT AOI

Both TFD and TFC in two directions significantly correlated with the number of visits to the external resources area. The coefficient value is positive and relatively small, which means the more visits there are for external consulting, the more CE is shown, as indicated by the slightly increased TFD and TFC in both directions.

Significant Variables to the ST+TT AOI in L1 translation

Allusion type

Directionality	**L1 translation**		**L2 translation**	
Eye-metrics	**TFD**	**TFC**	**TFD**	**TFC**

Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion type=1	-.16	**.038**	-.09	**.000**	.13	.194	.10	**.000**
Allusion type=2	0[b]	.	0[b]	.	0[b]	.	0[b]	.

Table 37 Eye-tracking: Allusion type in ST+TT AOI

Allusion type presented a significant effect (p<.05) only in L1 translation, but not in L2 translation. Interestingly, the coefficient values in two directions are converse: negative in L1 translation and positive in L2 translation. In other words, in L1 translation, dealing with the ST sentences that contain the PN allusions (Type 1) required less CE than those containing KP allusions (Type 2) significantly, indicated by both TFD (B=.16; p=.038) and TFC (B=.09; p=.00). However, in L2 translation, Chinese ST sentences that contain the Chinese KP allusions conversely required less CE than those containing Chinese PN allusions, significant in TFC (B=.10; p=.00) but not in TFD (B=.13; p=.194). We cannot conclude the correlation between allusion type and CE in L2 translation since the TFD did not reach a significant level (p=.193), yet the positive coefficient has shed light on the differences in translation directionality, compared to the negative coefficient in the L1 translation.

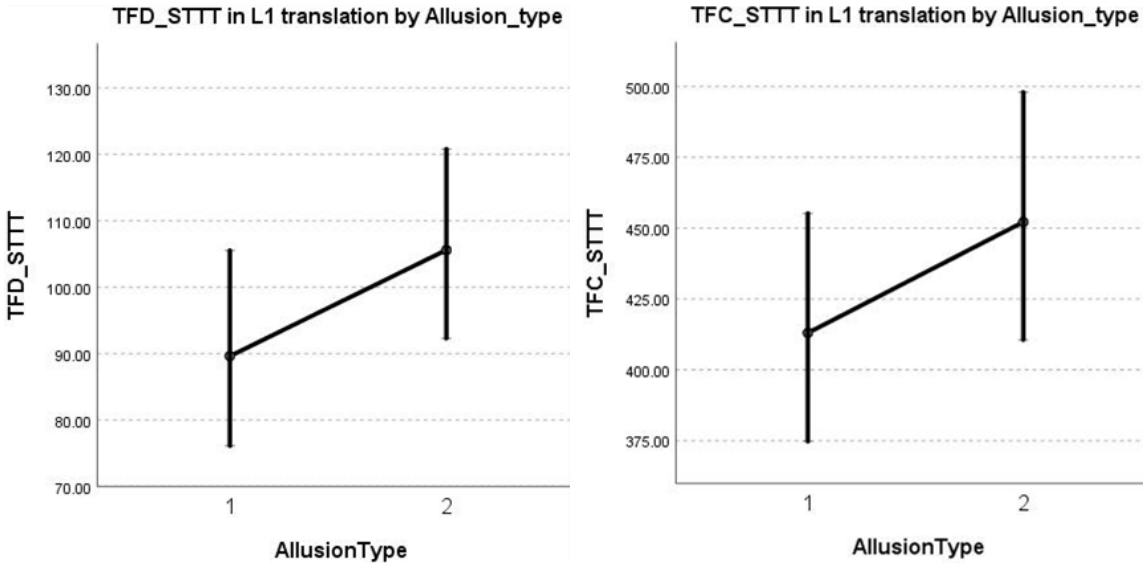

Figure 49 TFD and TFC in L1 translation ST+TT AOI by Allusion type

In L1 translation, translating the sentences that contain the PN tends to be less demanding than those containing the KP allusion, while in the L2 translation, the situation is very likely to be converse. One of the interpretations of this discrepancy is very likely due to the globalisation of English. As English culture integrates into the Chinese environment, some overt allusions are no longer culture-specific but transcultural. Therefore, it would be easier to find the equivalence or comprehend the meaning of the English PN for Chinese translators.

The evidence in the external consulting model proved this conclusion in which the sentences that contain the PN allusion in both directions of translation received more TFD and TFC in the external consulting area than the KP allusion sentences. In L2 translation, however, the indicators in the external consulting did not replicate the same level of effectiveness as only TFC reached the significant level (p=.00). Compared to the English PN allusion, the Chinese PN allusions can hardly find equivalent translation in English culture. Even though it might be easier for the Chinese translator to comprehend the meaning of Chinese PN allusions, it is still demanding for them to transfer the meaning into English, as reflected by the increase of TFD and TFC in the translation process.

Paragraph length

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Paragraph word	-.01	**.000**	-.01	**.000**	.01	.458	.01	**.001**

Table 38 Eye-tracking: Paragraph length in ST+TT AOI

The paragraph word count, which is the word count of the context around the underlined sentence, presents an unexpected result: the coefficient values for the two eye-metrics in the L1 translation are negative (B=-.01), indicating that the longer the context is, the slightly less CE is allocated in L1 direction. On the other hand, the correlations in the L2 translation are positive (B=.01), in which the TFC reached the significant level, whereas the TFD failed. The negative correlation in L1 translation showed that the longer the English paragraph around the ST sentence, the less the CE is found in the translation process; in L2 translation, the longer the Chinese context is, the higher the number of fixations but not necessary longer fixations (p=.458) are allocated in the ST and TT area.

The finding confirmed the potential that the context provided for the translation could, at a certain level, contribute to a less cognitive-demanding translation in L1 translation, possibly in providing helpful information to better understanding the ST sentences, especially when it comes to a sentence that contains culture-specific items like allusion. However, in L2 translation, the longer the Chinese context around the underlined sentence, the more fixations significant and longer fixation time insignificant in the translation process. The more context did not benefit in understanding the ST sentence, possibly because in L2 translation translators required far less extra information to understand the ST sentence in their L1.

Insignificant Variables to the ST+TT AOI in the translation process

Directionality	**L1 translation**				**L2 translation**			
Eye-metrics	**TFD**		**TFC**		**TFD**		**TFC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Experiences_type=0	.10	.459	.06	.576	-.12	.449	-.23	.064
Experiences_type=1	0[b]	.	0[b]	.	0[b]	.	0[b]	.
Allusion Familiarity	.03	.464	-.03	**.000**	-.04	.525	-.01	.277
Typing speed	3.65	.058	62.02	**.000**	.17	.679	.04	.840

Table 39 Eye-tracking: Insignificant variables in ST+TT AOI

No significant effect has been found between the translator's experience and their CE, both shown from TFD and TFC, in both directions of translation, meaning that no differences in the CE spent in the translation process between the undergraduates and postgraduates were found. As reported from the pre-test questionnaire, there is no difference between the years of translation training between two groups, meaning the gap between the two groups is not significant in terms of translation competence or expertise. Consequently, no differences in CE allocation have been found between the two groups. Thus, it is suggested that the classification between the participants' groups should be extended for future studies, for instance, student and professional translators, to have a more significant difference in the translation expertise.

The impact of allusion familiarity is not significant either since only the TFC in the L1 translation reached a significant level. Therefore, we could conclude that the effect of allusion familiarity is not significant enough to impact the overall translation process. A similar pattern is found in individual typing speed where only TFC in L1 translation reached the significant level, indicating the individual typing speed has no impact on the overall CE in the translation process.

5.1.1.4 Summary

Table 38 lists the test result of three hypotheses on the CE allocated in the Macro AOIs. According to the results, two of the three hypotheses have been confirmed, with the second hypothesis partially confirmed.

Hypothesis	**Result**
1. The L2 translation is more demanding than the L1 translation	Confirmed
2. In L1 translation, ST comprehension required more CE than TT production; in L2 translation, TT production required more CE than ST comprehension	Confirmed in L1 translation, failed in L2 translation
3. External resources searching required more CE in L2 translation than L1 translation	Confirmed

Table 40 Summary of the hypothesis for Macro AOIs

Tables 39 and 40 provide an overview of variables that affect the CE allocation in the Macro AOIs. Table 39 lists variables and their correlation to the CE in the External resources (Browser) AOI. Allusion familiarity proved to be negatively correlated to the CE in the AOI in both directions. Sentence word or the ST length and the allusion type were correlated with the CE in L1 translation only, while the participants' translation experience showed a significant impact in L2 translation only. The other variables were insignificant or significant in only one CE indicator; thus, convincing conclusions could not be made.

Variable name	Correlation in L1 translation	Correlation in L2 translation
Experiences_type	Not significant	Undergrads>Postgrads
Skopos_type	Significant in TFC	
Sentenceword	Positive	Significant in TFC
Paragraphword	Significant in TFC	
Allusion_type	Proper name > Key-phrase	Significant in TFC
AllusionFamiliarity	Negative	

Table 41 Summary of factors that influence the CE in ER AOI

Table 40 presents the correlation between related variables and the CE allocated in the ST and TT AOI in the translation process. Different types of Skopoi are confirmed to affect the CE in the translation process in both directions. Meanwhile, both Sentence word and ER visits demonstrated a positive correlation with the CE. Allusion type significantly influenced the CE in the L1 translation process, and paragraph word (the context length) was negatively correlated with the CE in the same direction.

Variable name	Correlation in L1 translation	Correlation in L2 translation
Experiences_type	Not significant	
Skopos_type	Leisure reading > Educational purpose	
Sentence word	Positive	
Paragraph word	Negative	Significant in TFC
Typing Speed	Significant in TFC	Not significant
Allusion_type	Proper name < Key-phrase	Significant in TFC
Allusion Familiarity	Significant in TFC	Not significant
ER Visit	Positive	

Table 42 Summary of factors that influence the CE in ST+TT AOI

5.1.2 Cognitive Effort and the Comprehension of Allusions

Analysis and discussion in this section explored determined the impact of allusion in two directions, respectively, to CE allocation during the comprehension process. Furthermore, it will touch upon the effect of Skopos and allusion type, length, and familiarity on the CE. The analysis will look into the comprehension process of translation with eye-tracking data allocated in the ST area through T-test

and GLMM analysis. Unlike the previous section that compares the cognitive effort in relatively larger AOI areas (ST, TT, ER), the AOIs in this section are relatively small and set around the target items.

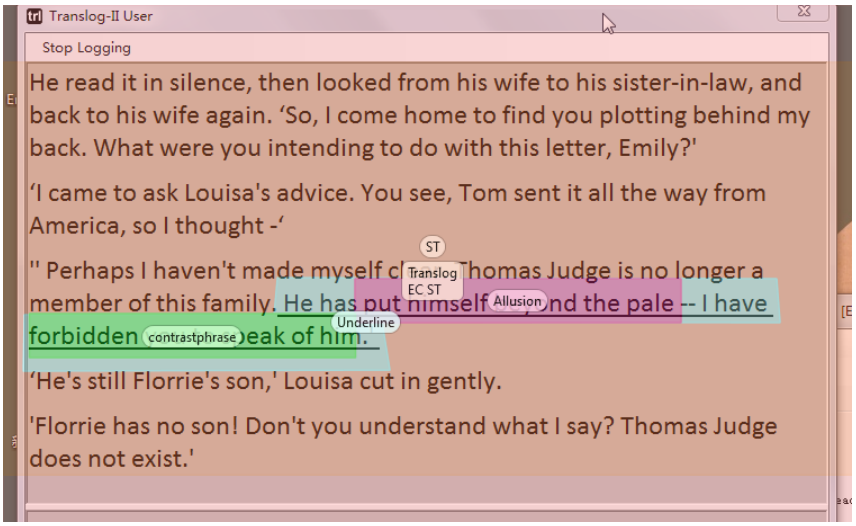

Figure 50 Screenshot: Micro AOIs

Besides TFD and TFC, total visit count (VC) as a new eye-data metric will be introduced quantitatively in this section. The same method will be applied to determine whether participants' allocation of cognitive efforts on comprehending allusion differs significantly from non-allusion into two directions regarding the overall amount of cognitive efforts. Compared to the larger areas like ST and TT AOIs, Visit count is more sensitive in small AOIs as it can precisely reflect the gaze data of the participants on the smaller segments and eliminate the possible effect outside the AOIs by focusing on the number of visits located on specific AOIs: Allusion AOI and Contrast AOI. Quantitative results from the t-test, which explore the mean difference in two different occasions (English Allusion vs Chinese Allusion, Allusion vs Non-allusion), are used as the primary evidence for analysis.

5.1.2.1 Allusions in E-C translation VS C-E translation

This section comprises two sections: an overview of the mean difference comparison of eye-tracking data in the Allusion AOIs in E-C and C-E directions, and the GLMM provides further detail on potential independent variables that may play a part in the difference.

5.1.2.1.1 L1 Translation VS L2 Translation

It seemed no doubt that comprehension of the English Allusion, which is the allusion from foreign language and culture, required more cognitive effort than the Chinese Allusion, which is from participants' own culture and language. Both Figure 50 and Table 41 below confirmed the assumption

that three metrics reached the significance of 0.01 level (Sig.<.01), which means through the t-test analysis, the comprehension of English Allusion required more cognitive effort than Chinese allusion. T-test shows a significant difference in comprehending English and Chinese Allusion, but we cannot ensure whether the differences are due to translation direction only or other factors involved, such as AOI length and allusion familiarity.

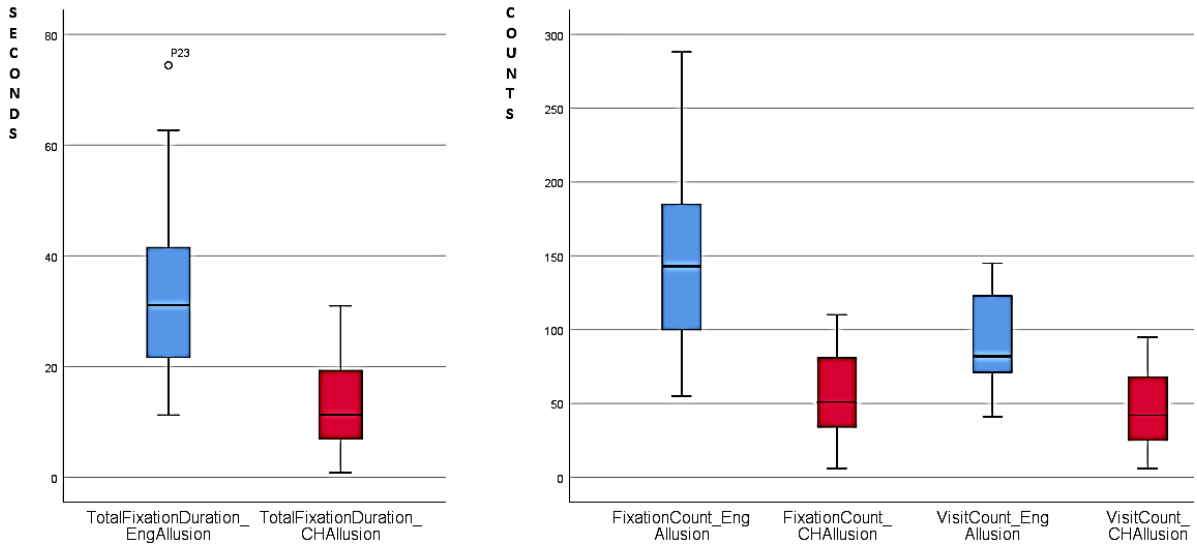

Figure 51 Boxplot: TFD and TFC for allusion in both directions

Ranks

	Language	N	Mean Rank	Sum of Ranks
Total Fixation Duration	Eng	180	220.06	39610.00
	CH	180	140.94	25370.00
	Total	360		
Fixation Count	Eng	180	222.43	40037.00
	CH	180	138.57	24943.00
	Total	360		
Visit Count	Eng	180	217.81	39206.00
	CH	180	143.19	25774.00
	Total	360		

Mann-Whitney Test Statistics

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Total Fixation Duration	9080.000	25370.000	-7.212	.000
Fixation Count	8653.000	24943.000	-7.650	.000
Visit Count	9484.000	25774.000	-6.810	.000

Table 43 MWU test: CE indicators for allusion in both directions

5.1.2.1.2 CE allocation in Allusion AOIs in both directions

Table 42 below gives definitions of the statistical model for the GLMM analysis with dependent variables: Total Fixation Duration, Total fixation count and Visit count. Table 42 lists all the variables in model 1, comparing L1 and L2 translation in Allusion comprehension.

	Variables name	Description
Dependent/Target	Total fixation duration	The sum of every single fixation time located within every allusion or non-allusion AOI from all 12 source texts translated by each participant.
	Total fixation count	The number of fixations located within every allusion or non-allusion AOI from all 12 source texts is translated by each participant.
	Visit count	The sum of the gaze's number enters and exits a target AOI (Allusion or non-allusion) from all 12 source texts. This section looked at the revisits count, which is the number of visits count -1
Fixed factors (For Model1)	Translation experience	undergraduates (coded as 0) postgraduates (coded as 1)
	Allusion type	proper name (coded as 1) key-phrase (coded as 2). The contrasting phrase is coded as 0 and filtered before the analysis with the variable *Allusion or Not (0 or1).*
	Skopos	leisure reading (coded as 1) translating for culture or language learning (coded as 2)
	AOI length	The length of allusion (count in words) may affect the eye-tracking metric as it has been proved that there is a positive effect of word length in fixation-related metrics[11].
	Allusion Familiarity	the familiarity of allusions in the L1 environment

[11] Long words generally receive longer and more fixations than short words (M. Just & P. Carpenter, 1980; Kliegl, Grabner, Rolfs, & Engbert, 2004).

	ER Visit	The sum of the number of times that the gaze enters and exits a target AOI.
Random effect	Allusion/Contrast ID	Corresponding allusion AOIs/contrast AOIs embedded within the underlined sentences, which the participants were required to translate. Allusion ID is a random effect since all the allusions are chosen from natural texts, varied in length, familiarity factors.

Table 44 GLMM: List of variables for Micro AOIs Model 1

Model 1 tests how the potential factors influence the total fixation duration, total fixation counts and visit counts allocated on the Allusion AOIs in E-C and C-E translation. The variables used in GLMM are listed as shown below:

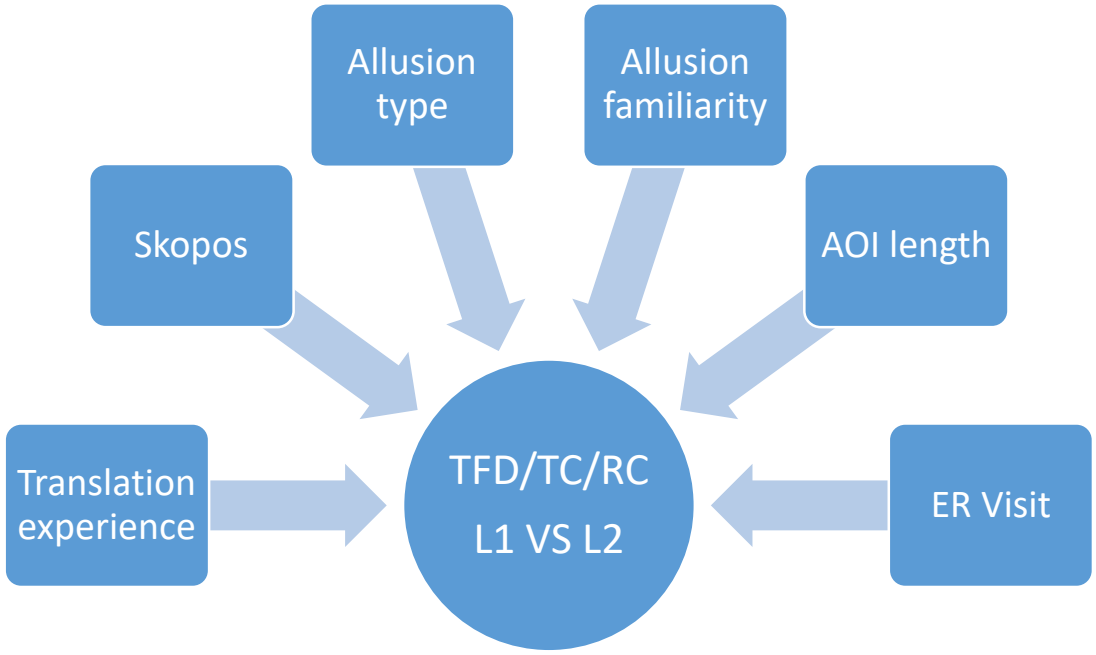

Figure 52 GLMM model for Allusion/Non-allusion AOIs in L1 and L2 translation

TFD, TFC and VC are not normally distributed but positively skewed. Therefore, Gamma with log link will be adopted as the model analysing the total fixation duration as the target or dependent variables since it is more suitable for the positive skewed distributed data and the Poisson log-linear model applied for both fixation counts and visit count as it works better with the count variables.

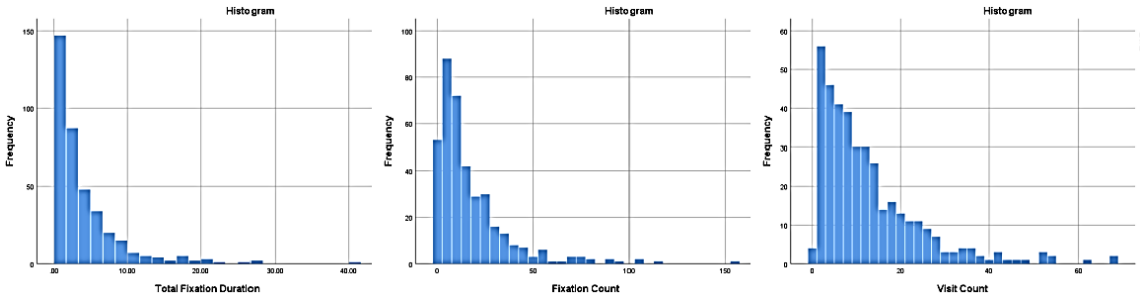

Figure 53 Data distribution for the CE indicators in allusion AOIs

Tables 43 and 44 summarise the correlations between the factors and the target variables, TFD, TFC and RC in L1 and L2 translation, respectively. Through the comparison between the two tables, it can be seen that there are similarities and differences in terms of the factors correlated to the allocation of CE, indicated by three eye metrics. Both allusion familiarity and AOI length (word count) significantly affect the CE's correlation when comprehending the allusion in both directions, reaching the significant level of 0.05. In contrast, the participant experience, which is the level of translation expertise, failed to reach the significant level and rejected its correlation to the CE allocation in the comprehension process of allusion. The number of revisits to External resources was correlated to the allocation of CE only in L1 translation, while Skopos and allusion type significantly affect the allocation of CE only in L2 translation.

Directionality	L1 translation						
Eye-metrics	**TFD**		**TFC**		**RC**		
Source	F	Sig.	F	Sig.	F	Sig.	
Corrected Model	15.225	.000	16.565	.000	17.302	.000	
Experience	.792	.375	.545	.461	2.050	.154	
Skopos	.186	.667	.017	.895	.000	.993	
Allusion type	5.912	**.016**	2.134	.146	1.711	.193	
Allusion Familiarity	5.439	**.021**	8.277	**.005**	13.284	**.000**	√
AOI length	26.022	**.000**	23.268	**.000**	18.459	**.000**	√
ER Visit	7.250	**.008**	6.863	**.010**	10.107	**.002**	√

Table 45 GLMM summary on CE in the allusion AOI in L1 translation

Directionality	L2 translation						
Eye-metrics	**TFD**		**TFC**		**RC**		
Source	F	Sig.	F	Sig.	F	Sig.	
Corrected Model	12.853	.000	10.236	.000	11.493	.000	
Experience	1.094	.297	.551	.459	.315	.575	
Skopos	8.359	**.004**	5.430	**.021**	5.876	**.016**	√
Allusion type	9.629	**.002**	7.289	**.008**	8.684	**.004**	√

Allusion Familiarity	21.477	**.000**	21.149	**.000**	23.755	**.000**	√
AOI length	5.136	**.025**	5.400	**.021**	6.528	**.012**	√
ER Visit	2.540	.113	3.113	.079	4.339	.039	

Table 46 GLMM summary on CE in the allusion AOI in L2 translation

Significant variables to the Allusion AOIs in both directions

Allusion familiarity

Directionality	L1 translation					
Eye-metrics	**TFD**		**TFC**		**RC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion Familiarity	-.232	**.021**	-5.959	**.005**	-4.236	**.000**
Directionality	L2 translation					
Eye-metrics	**TFD**		**TFC**		**VC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion Familiarity	-1.182	**.000**	-10.021	**.000**	-8.241	**.000**

Table 47 Eye-tracking: Allusion familiarity in allusion AOI

It is not surprising that the allusion familiarity has a strong and negative effect on CE allocation, as negative coefficients (B<0) are presented in all three metrics. In both directions, the TFD (p=.021; p=.000) and the TFC (p=.005; p=.000) all reached the significant level. The less popular the allusion is in the L1 environment, the more CE is paid to comprehend and pre-translate the allusion in L1 and L2 translation. Meanwhile, the newly introduced revisit count indicated that the more familiar the L1 speaker is with the allusion, the fewer revisits are required to comprehend and pre-translate it. It proved that when the participants are more confident in their understanding of the TT and the allusion); they are less likely to re-read or revisit the AOI. The finding is consistent with the research on reading, stating that the reader makes more regression when the text is complex (Booth & Weger, 2013).

AOI length

Slightly different from the word length calculated by letters, the allusion length was calculated based on the number of words within the allusion. Firstly, research has proved that the fixation time difference is significant between short (4-6 letter) and long (10-12 letters) words, while no significant differences are found on short or medium length words (Rayner, Slattrery, Drieghe, & Liversedge, 2011). Since words in all of the allusions in this research are less than eight letters, although the allusion length might be varied, the length of the letters within words did not contribute to the allusion length effect. Secondly, as the words in allusions are either short or medium, the landing

position of the word tends to be a little left nearer the centre (Rayner et al., 2011), and thus it can be inferred that when reading the allusion, the translator would either recognise the allusion as a whole or treat the allusion as separate words rather than letters. Therefore, the word count of the allusion can better represent the allusion length. Furthermore, since this research deals with allusions from both English and Chinese, the definition of the letter in the English language does not exist in the Chinese language due to the nature of Chinese language composition and therefore counting length based on the number of the letters does not apply in the Chinese allusions. On the other hand, the definition of a word in both languages can be the same and thus, the length is comparable across two languages.

Directionality	L1 translation					
Eye-metrics	**TFD**		**TFC**		**RC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion length	.350	**.000**	6.906	**.000**	3.451	**.000**
Directionality	L2 translation					
Eye-metrics	**TFD**		**TFC**		**RC**	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion length	-.688	**.025**	-5.899	**.021**	-4.961	**.012**

Table 48 Eye-tracking: Allusion length in allusion AOI

A strong positive impact of word count within an allusion to CE allocation in L1 translation has been presented in Table 46. The significant effect on the TFD (B=.350; p=.000) and TFC (B=6.906; p=.000) suggested that the more words within an allusion, the more CE required to comprehend it in L1 translation. However, in L2 translation, the correlation to the CE is negative, and it also reached the significant level in both TFD (B=-.688; p=.025) and TFC (B=-5.899; p=.021), meaning the allusions with more words in C-E require less CE than those in C-E with fewer words. The research of Rayner (1998) indicated that the more letters a word or words have in the AOI, the longer fixation it achieves. In this research, this statement has been only confirmed in L1 translation to demonstrate and extend that the more words a phrase has, the longer and more fixation (Sjørup, 2013) and more revisit it achieved.

The finding in the L2 translation, however, is unexpected. When translating the allusion from L1 to L2, the translators devote more CE to pre-translate the shorter allusion. The only possible interpretation is that in L2 translation, comprehending the allusion could rarely be a cognitively demanding task for the translators. The translators comprehend the allusion as a whole rather than chunks of words that they are required to comprehend one by one as in L1 translation. Meanwhile, in L2 translation, the

more words in the allusion, the more information provided to pre-translate the allusion. For instance, Chinese allusions comprised of four characters (4 words equivalent to English) might be easier to translate than three-character allusions for Chinese translators.

Significant variable to the Allusion AOIs in L1 translation

ER Visit

Directionality	L1 translation					
Eye-metrics	TFD		TFC		RC	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
ER Visits	.010	**.008**	.208	**.010**	.143	**.002**

Table 49 Eye-tracking: ER visits in allusion AOI

The revisit number to the ER area presented a positive and significant relationship with CE allocation in the allusion in L1 translation, as shown from TFD (B=.010; p=.008), TFC (B=.208; p=.010) and RC (B=.143; p=.002). In other words, when translating the English allusion into Chinese, the more visits to the external resources, the more CE to comprehend and pre-translate the allusion. This conclusion corresponded to the one found in the ST+TT AOI and the one from Michael Carl, Bangalore, and Schaeffer (2016), suggesting that the external resources, although they might provide solutions to the translation problems, would raise the CE in the process.

Significant variable to the Allusion AOIs in L2 translation

Skopos

Directionality	L2 translation					
Eye-metrics	TFD		TFC		RC	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Skopos=1	.403	**.004**	2.747	**.021**	25.172	**.000**
Skopos=2	0		0		0	

Table 50 Eye-tracking: Skopos type in allusion AOI

The translation skopos was proved to contribute to CE allocation in Allusion AOIs only in L2 translation, as suggested by TFD, TFC and RC. A similar correlation was not found in the L1 translation. It might be possible that in L1 translation, the translators are less likely to consider the Skopos as most of the CE has been allocated to the comprehension of allusions. The participants can rarely devote more attention to the Skopos. The awareness of the Skopos and readership are generally linked to the later stages after the ST comprehension. While in the L2 translation, when comprehension no longer presents a demanding difficulty, the consideration of the Skopos and the prospective readership might have a more significant impact on the CE. It should be noted that further evidence for this assumption will be explored through the qualitative analysis of the retrospective interview in the following section.

By comparing the two Skopoi, it is also unexpected that pre-translating the same allusion for leisure reading required more CE than the culture learning skopos, indicated by TFD (B=.403; p=.004), TFC (B=2.747; p=.021) and RC (B=25.172; p=.000). One of the possible reasons would be the readership along with the translation purpose. The target readers for the leisure reading skopos are designed to be those who have no or little knowledge about the SC, while the readers for the educational purpose are assumed to be those who can understand but are also willing to learn more about the authentic SC. Therefore, translating for the former group may require more consideration than the latter one. It is reasonable to anticipate that translating for the reader that does not know the source language and culture may be more complicated than translating for those who already have a certain level of knowledge. This finding coincides with the one found in the previous analysis on ST+TT AOI, where the Skopos is significant in affecting the CE in the whole translation process in both directions, and the translation for leisure reading for people who have little access to the SL required more CE than translation for educational purpose to "insider" readers.

Allusion type

Directionality	L1 translation					
Eye-metrics	TFD		TFC		RC	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusiontype=1	.560	**.016**	6.974	.184	3.452	.193
Allusiontype=2	0		0		0	
Directionality	L2 translation					
Eye-metrics	TFD		TFC		RC	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusiontype=1	-1.386	**.002**	-10.078	**.008**	.664	**.004**
Allusiontype=2	0		0		0	

Table 51 Eye-tracking: Allusion type in allusion AOI

The correlation between allusion type and CE is significant only in L2 translation (p<.05), which means whether the allusion is the PN or KP would influence the CE only in L2 translation. In L1 translation, however, only the TFD (B=.560; p=.016) has been affected by the allusion types. The results suggested that in the comprehension process of allusion in L1 translation, no significant difference was found between the two types of allusions. In contrast, in L2 translation, the PN allusion is more straightforward to comprehend than the KP allusion, and types of allusions significantly affect the CE in the allusion AOI.

Insignificant variables

Experience

Starting from the non-significant variables which violate the expectation, the participant translation experience has no significant effect on the TFD allocated on the Allusion AOIs. Two possible reasons may contribute to this result. Firstly, the number of each group of participants is varied, with seven undergraduates 23 postgraduates participating in the research. Therefore, although the model considered the difference between participants' numbers in each group, the large gap between the group number is very likely to cause bias when collecting data. Secondly, if we anticipated no technical bias in the participant recruitment in this research, it is also possible that translation experience does not affect the CE when comprehending allusion. Previous studies have discrepancies on fixation patterns between students and professionals. With a relatively small pool of participants, N. Pavlovic and Jensen (2009) showed that the student translator required more TFD than the professionals. They reasoned the findings with the hypothesis that the student has not developed effective strategies to reduce the amount of time or effort for translation. However, Dragsted (2010) study on the gaze pattern implied the student tends to have shorter fixations while the professional's fixations tend to be longer and might suggest the lack of effective strategies is not the only factor that leads to the difference between the two groups of participants.

5.1.2.2 Allusion VS Non-allusion in two directions

This section aims to answer RQ1b: Would there be any differences in the allocation of cognitive efforts between translating allusive and non-allusive phrases in two translation directions? T-test and GLMM analysis will be adopted in which the former provides general insight on the mean differences of allusion and non-allusion phrases, and the latter looks into the effects that may influence the differences.

5.1.2.2.1 Allusion VS Non-allusion

The t-test examines whether there is a statistical difference between the allusion and non-allusion in L1 and L2 translation, respectively. The cluster bar chart Figure 53 presents the general comparison of TFD, TFC and revisit count (RC) of the Micro AOIs, allusion and non-allusion phrases. In Figure 53, the red bar refers to the eye metrics allocated in the allusion AOIs (6 English and 6 Chinese), and the blue one is the metrics on the corresponding 12 non-allusion AOIs (Contrast).

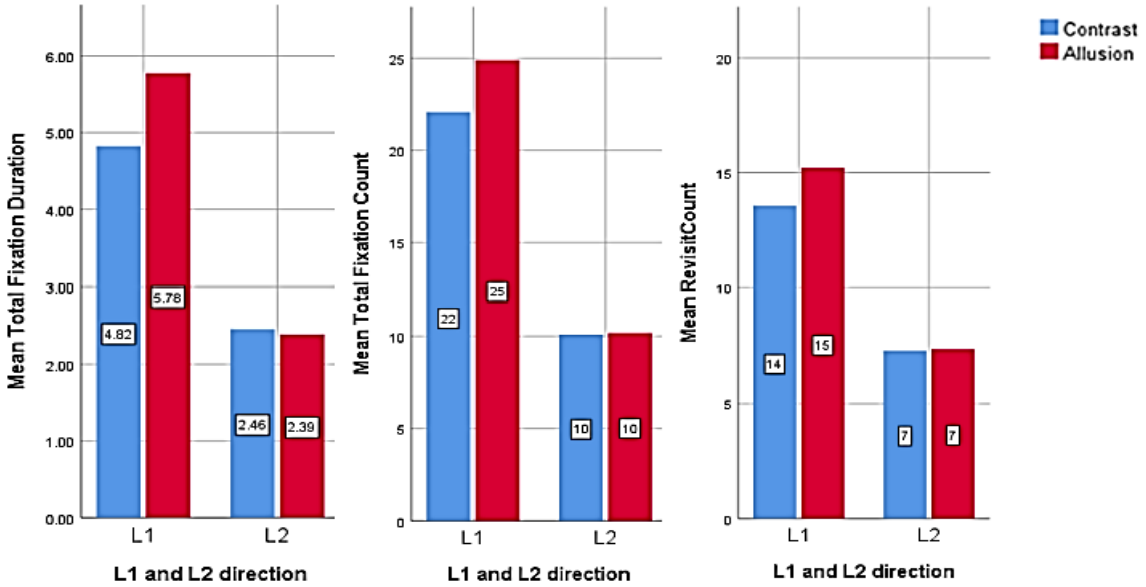

Figure 54 Cluster bar: Allusion VS Contrast

Firstly, the differences in CE allocation between the two directions are apparent, as can be seen from both allusion and non-allusion groups, with the L1 translation requiring more CE than the L2 translation. Secondly, by comparing the allusion AOIs with the non-allusion AOIs, it can be seen that in L1 translation, the English allusion AOIs present a higher value in all eye-metrics than the non-allusion phrases, which means that comprehending the English allusion is more demanding to the participants than the non-allusion phrases. However, in L2 translation, the eye-metrics collected when comprehending Chinese allusion and Chinese non-allusion phrases are alike, showing that for Chinese translators, comprehending Chinese allusion is not necessarily more complex than comprehending Chinese non-allusion phrases. Participants even occasionally allocate more TFD in the non-allusion AOIs than the allusion ones.

The trends in two translation directions have been confirmed statistically by the paired-sample t-test in Table 50. Two metrics, TFD and TFC, have shown significant differences between the allusion AOIs and non-allusion ones, with the former outweighing the latter (M=0.441/1.449; Sig.<.05). Suggested by the positive mean figure M (marked in red), the allusion AOIs has been proved to receive longer and more fixations than the non-allusion AOIs. Nevertheless, the RC did not reach a significant level, indicating that the participating translators are not necessarily revisiting the allusions more times than the non-allusion phrases. A similar conclusion has been drawn by Sjørup (2013), looking at the effect of metaphor and non-metaphor on cognitive effort in the translation process, which indicated the effect of TYPE (metaphor and non-metaphor) did not reach the significant level alone in the analysis. However, it should also be noted that the conclusion drawn from Sjørup (2013) is based on the Danish and English context and only deals with the L1 translation of metaphor. It remains

doubtful whether a similar conclusion can be extended to the L2 translation and into another noncognate language like Chinese and, most importantly, can be applied to the translation of allusion.

Divergent situations have been found in the L1 and L2 translation. In the L1 direction, statistics prove that comprehending English allusion is significantly more demanding than the non-allusion phrase, with all metrics confirmed (M=0.951/2.812/1.634; Sig.<.05). In L2 translation, on the contrary, none of the eye-metrics reached a significant level with overwhelmingly large Sig. Value. Furthermore, the TFD mean value witnesses a negative value (marked blue), meaning that the participants possibly fixate longer on the Chinese non-allusion phrases than the Chinese allusions, although it failed to reach a significant level. Therefore, it can be concluded that in L2 translation, comprehending allusion for translation is no more cognitive-consuming than the non-allusion phrase in the first language. In contrast, in the L1 translation, allusion comprehension is significantly more demanding than non-allusion phrase comprehension in the foreign language.

Paired Differences	**TFD Allusion - TFD Contrast**			**TFC Allusion– TFC Contrast**			**RC Allusion – RC Contrast**		
	Mean	Std. Deviation	Sig. (2-tailed)	Mean	Std. Deviation	Sig. (2-tailed)	Mean	Std. Deviation	Sig. (2-tailed)
General	0.441	4.061	**.037**	1.449	15.547	**.048**	.852	8.806	**.063**
L1	.951	5.086	**.012**	2.812	20.066	**.036**	1.634	10.399	**.033**
L2	-.068	2.586	.719	.086	8.852	.895	.070	6.794	.889

Table 52 T-test: Allusion VS Contrast General

It appears that the t-test has come up with some conclusive results. However, those results are problematic since too many other variables cause the differences or lack of differences between the two types, such as AOI length, Allusion familiarity, Translation Skopos. To determine whether the differences in the cognitive effort are caused solely by the type of AOIs (Allusion and non-allusion) and the interrelationship with other factors, the GLMM has been applied to run the analysis and adjust for differences between individual participants.

5.1.2.2.2 CE allocation in Allusion Vs Non-allusion AOIs in both directions

The variables in GLMM model 2 are shown in the table and figure below:

Fixed factors	Allusion/Contrast	Non-allusion (contrast) phrase (coded as 1)

(For Model 2)		Allusion (coded as 2)
	Phrase word count	The number of words that the phrase or allusion has (count in words)
	Phrase frequency	This variable is specifically designed for Model 2 to compare across allusions and contrast phrases to see whether the frequency of the phrase or allusion in the L1 national corpus affects the eye-tracking data with other variables.

Table 53 GLMM: List of variables for Micro AOIs Model 2

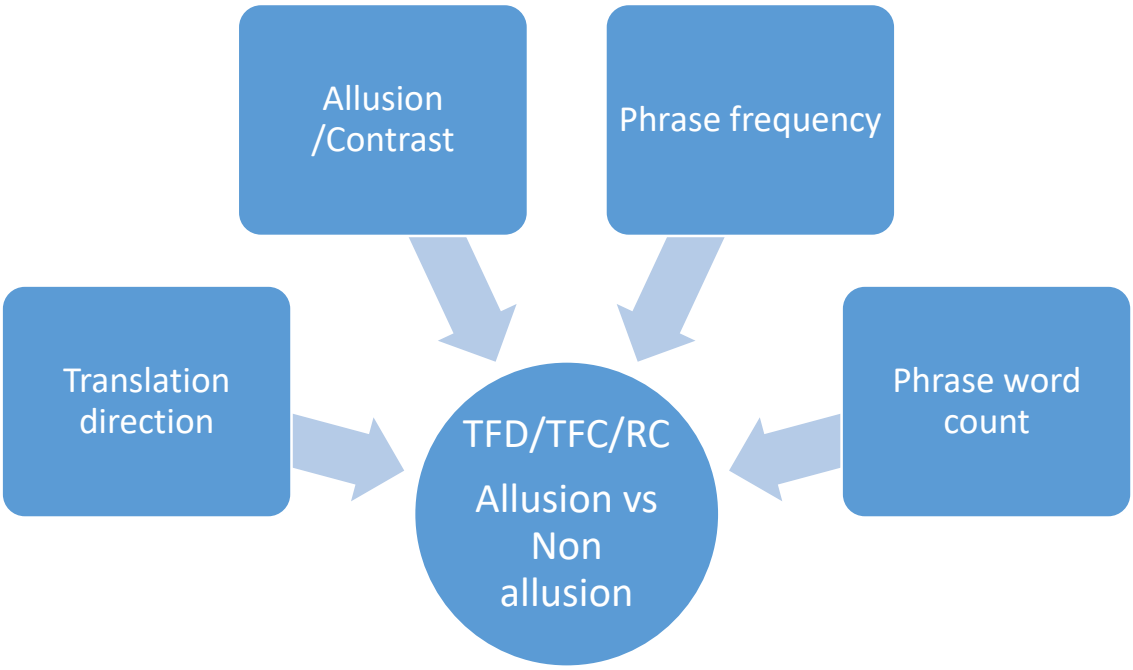

Figure 55 GLMM model for Allusion/Non-allusion (Contrast) AOIs

The results of the GLMM analysis confirm and clarify the conclusion from the t-test. In L1 translation, as observed in Table 52 below, all the variables reached significant levels of 0.01, which means the independent variables strongly affect the allocation of cognitive effort when comprehending the allusion or phrase in the AOI. Firstly, compared to the non-allusion phase, the allusion significantly costs more CE and is more demanding to comprehend. Allusion_YN (code 2) has been set as the baseline 0 for the analysis, and the coefficient value of code 1 in all three eye-metrics present consistent negative figures, which means that non-allusion phrases (or word) receive significantly (Sig.<0.01) less cognitive efforts. Therefore, we can confidently conclude that in L1 translation, comprehending allusion is significantly more cognitively effortful than the non-allusion, making the former more cognitively demanding than the latter.

Meanwhile, the frequency of the allusion and non-allusion in the native corpus and word count has been considered to affect the CE. The statistic outputs indicate that for both allusion and non-allusion, the word count number and frequency of the phrases in the national corpus significantly affect the allocation of cognitive effort to comprehend the phrases. It should be noted that although the frequency variable has a significant negative effect, the coefficient value indicates that the relationship is overwhelmingly weak (-.001). In other words, the frequency in the native corpus would have only a small effect for the translator who is the L2 user of the language to comprehend the allusion or non-allusion.

Directionality	L1 translation					
Eye-metrics	Total Fixation Duration (TFD)		Total Fixation Count (TFC)		Revisit Count (RC)	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Corrected Model	1.143	.000	12.740	.000	10.241	.000
Allusion_YN=1	-.295	**.001**	-6.211	**.000**	-3.904	**.000**
Allusion_YN=2	0	.	0	.	0	.
Word Count	.199	**.000**	4.858	**.000**	2.232	**.000**
Phrase Frequency	-.001	**.000**	-.013	**.000**	-.008	**.000**

Table 54 GLMM summary on CE in the allusion/non-allusion AOI in L1 translation

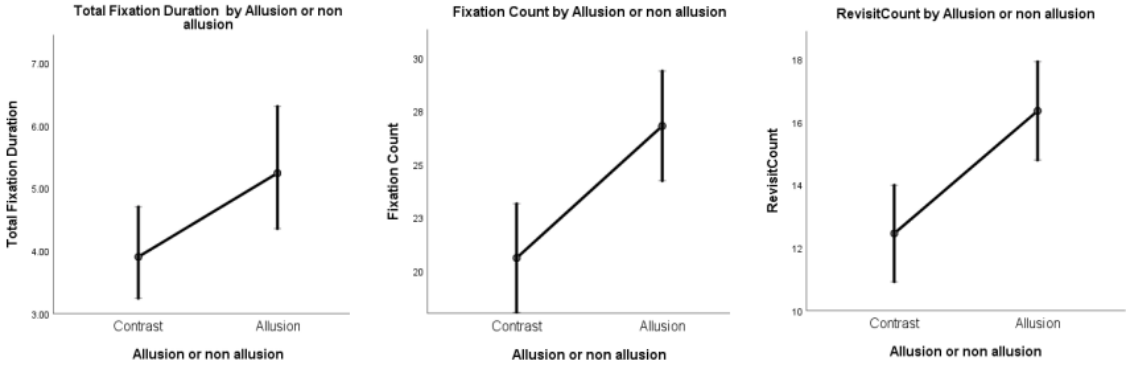

Figure 56 CE indicators in L1 directions by Allusion YN

Directionality	L2 translation					
Eye-metrics	Total Fixation Duration (TFD)		Total Fixation Count (TFC)		Revisit Count (RC)	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Corrected Model	-.717	.028	-.348	.761	-.629	.479
Allusion_YN=1	-.050	.635	-.521	.147	-.619	**.034**
Allusion_YN=2	0	.	0	.	0	.
Word Count	.413	**.000**	2.962	**.000**	2.293	**.000**
Phrase Frequency	-8.995E-5	.339	-7.350E-5	.763	.000	.197

Table 55 GLMM summary on CE in the allusion/non-allusion AOI in L2 translation

Except for the word count of the allusion or non-allusion, none of the variables reaches a significant level in more than two eye metrics in L2 translation. Although the non-allusion receives less TFD and TFC than the allusion on average, the results are insignificant. Only the revisit count shows a significant difference, meaning that the translators revisited or looked back more times to comprehend the allusion than the non-allusion.

The word count of the phrase has been proved to significantly affect the allocation of CE with a positive correlation. On the other hand, the Phrase frequency has no relationship with the cognitive effort to comprehend allusion or non-allusion in L2 translation since they are in their first language. One of the potential reasons would be the limited number of the comparison group. It might be insufficient to generalise with only 12 allusions and non-allusions. The other possible reason is that since the allusion and non-allusion are the L1 of the participated translator, the frequency within the corpus is not equivalent to the familiarity of those phrases within the participants as native speakers. The ways they learnt or familiarised themselves with those words or phrases are various rather than solely from the materials recorded in the national corpus since they grew up within the environment. Therefore, the frequency within the corpus cannot represent to what degree they are familiar with their native allusion or phrases. While in the L1 translation, the allusion and non-allusion phrases are in the participants' foreign language who learnt those words or phrases from learning materials that, no matter in which genres, are most recorded in the national corpus. Therefore, the frequency in the corpus can be linked to the degree of familiarity of the participants.

In sum, both the t-test and the GLMM analysis show that in L1 translation, allusion comprehension receives more cognitive effort than the non-allusion phrases, meaning it is more challenging to understand allusion than non-allusion phrases. In contrast, no significant difference has been found between comprehending the two types in L2 translation. No research to date explores the cognitive effort between allusion and non-allusion. However, similar research has been done on the linguistic metaphor, which demonstrated that the expression type (linguistic metaphor) could significantly impact the cognitive effort in L1 translation in the comprehension-related process. In contrast, for the L2 translation, the expression types do not significantly affect the attention unit[12] proportion (Wang, 2017). Wang (2017) pointed out that in L2 translation, when the source text is effortless to read, comprehending the metaphor in the first language is no more cognitively demanding than the non-

[12] Another kind of indicator of cognitive effort (Hvelplund, 2011)

metaphor. Therefore, the conclusions in the above section found admirable coherence with Wang's project.

5.1.2.3 Summary

In conclusion, allusion familiarity witnessed a negative correlation with the CE in the Micro AOI, allusion AOI in both directions. Both AOI length and visits to ER presented a positive correlation in L1 translation only. However, the AOI length showed a negative correlation in L2 translation. CE allocation differed according to the skopos type and allusion type in L2 translation. Furthermore, the t-test and GLMM analysis also proved that in L1 translation, comprehending allusion was more cognitively demanding than the non-allusion phrase, while for L2 translation, there is no difference between allusion and non-allusion.

Variable name	Correlation in L1 translation	Correlation in L2 translation
Experience	Not significant	
Skopos	Not significant	Leisure > Educational
Allusion type	Significant in TFD	Proper name < key-phrase
Allusion Familiarity	Negative	
AOI length	Positive	Negative
ER Visit	Positive	Not significant

Table 56 Summary of factors that influence the CE in Allusion AOI

Hypothesis	Result
1. Comprehending allusion is more demanding than non-allusion phrases.	Confirmed in L1 translation, failed in L2 translation

Table 57 Summary of the hypothesis for Micro AOIs

5.2 Typing Activities from Key-logging Experiment

This section presents the key-logging data from the experimental translation test, collected through the Translog and imported into SPSS for a series of quantitative analyses. By triangulating the key-logging data with the previous eye-tracking analysis, it aims to answer RQ1a and RQ1c to look at the CE allocation in L1 and L2 translation from the perspective of TT production. The analysis comprises two parts firstly, the descriptive analysis of key-related data in two translation directions and secondly, the GLMM analysis on pause length and number during the TT production and factors that possibly influence it.

5.2.1 Delete number and ratio

It is worth looking at the deletion and revision and how the directionality affects those two metrics. TT production involves a lot of deletion or revision. Some revision relates to the correction of typos, but generally, there are also more substantial changes, either in form or content. Due to the different translation behaviours of individual participants, some revisions happened after the draft had been completed as "end" revision while other revisions were undertaken as the translation was being drafted, as "online" revision (Krings, 2001). It would be challenging to locate the revision from individual participants and calculate the time length. Therefore, the total number of deletions instead of total revision time will be explored to look at the revision phrase during the translation process in two translation directions.

Deletions can be achieved through backspace or by pressing the delete key. Thus the counting of the number of deletions number (Del_number) refers to the number of backspace and deletion keystrokes in the Translog, and the deletion ratio (Del_byIns) refers to the ratio between the deletion number and the number of all the other kinds of keystrokes (insertion number).

As suggested by Figure 56 and the following Normality test, the distributions of the Del_number and the Del_byIns are not normal (p=.000), showing positive skewness.

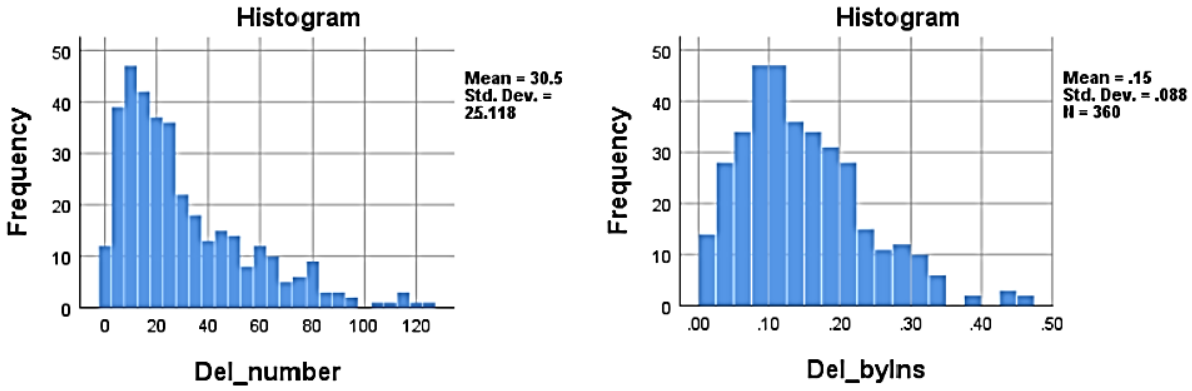

Figure 57 Data distribution for the Deletion metrics

Both box plots in Figure 57 present a higher number and ratio of deletions in the L2 translation (red) than L1 translation (blue), meaning throughout TT production, participants tend to do more revisions in the L2 translation than the L1 translation. The statistics further supported the conclusion with the results significantly found in the deletion number (U=8091.5, N=168, p=.000) and the deletion ratio (U=7772.5, N=168, p=.000). In English to Chinese translation, the L1 translation to the participants, a lower number of deletions (M1=1302.66, M2=204.34), as well as a smaller deletion to insertion ratio (M1=130.76, M2=206.24) was found than in L2 translation, indicating when doing the Chinese to

English translation, more revision happened in the production process, no matter whether it relates to typo or form or content changes. However, the conclusion differs from Jakobsen (2003) research between English and Danish, in which no significant effect was found between directionality and the revision. Despite the language differences, Jacobsen's research was conducted on the expert and semi-professional, while participants in this research are mostly student translators. The relatively lower L2 proficiency might contribute to the higher number and larger deletion ratio in the L2 translation, making it significantly different from the L1 translation.

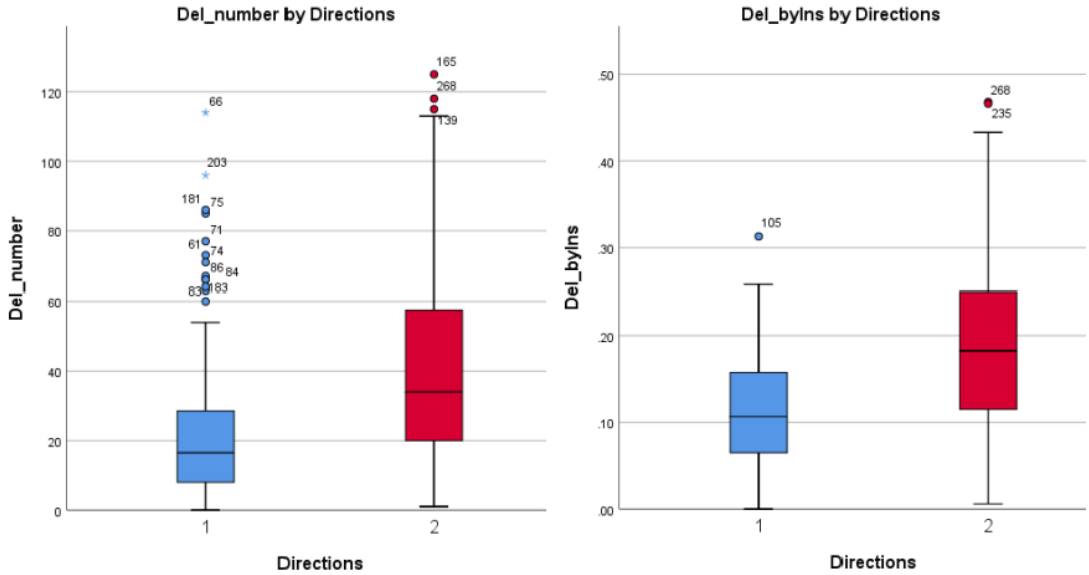

Figure 58 Boxplot: Deletion metrics in two directions

Ranks				
	Directions	**N**	**Mean Rank**	**Sum of Ranks**
Del_number	1	168	132.66	22287.50
	2	168	204.34	34328.50
	Total	336		

Mann-Whitney Test Statistics				
	Mann-Whitney U	**Wilcoxon W**	**Z**	**Asymp. Sig. (2-tailed)**
Del_number	8091.500	22287.500	-6.764	.000

Table 58 MWU test: Deletion number in L1 and L2 translation

Ranks				
	Directions	**N**	**Mean Rank**	**Sum of Ranks**
Del_byIns	1	168	130.76	21968.50
	2	168	206.24	34647.50
	Total	336		

Mann-Whitney Test Statistics

	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Del_byIns	7772.500	21968.500	-7.121	.000

Table 59 MWU test: Deletion ratio in L1 and L2 translation

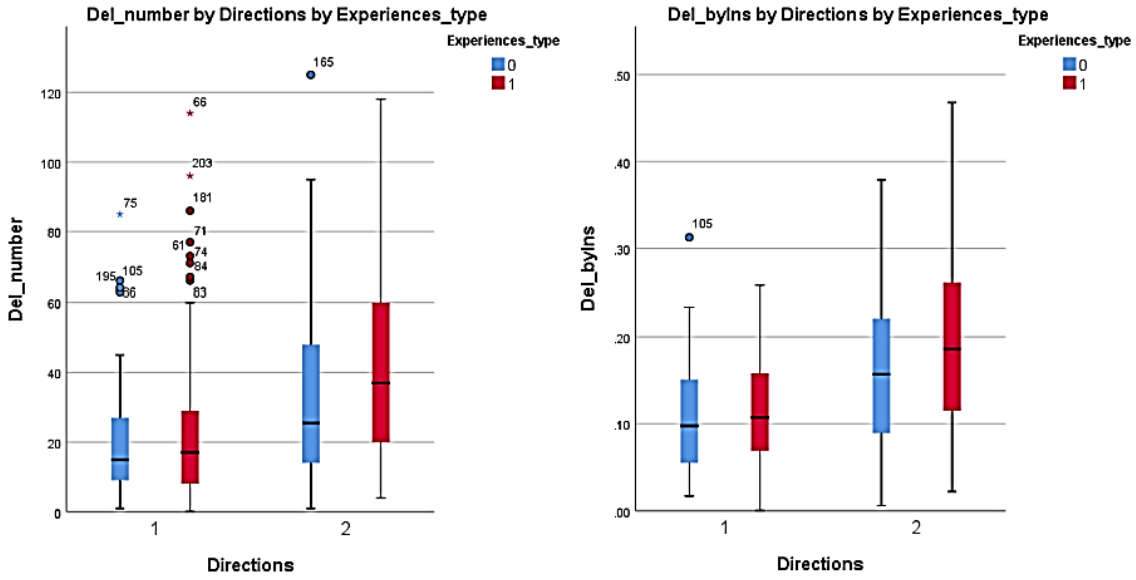

Figure 59 Boxplot: Deletion metrics in two directions by Experience type

Mann-Whitney Test Statistics									
Directionality		L1 translation				L2 translation			
Experience type	N	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
UG	42	81.83	2534.0	-.41	.681	72.02	2122.0	-1.920	.055
PG	126	85.39		0		88.66			

Table 60 MWU test: Deletion numbers by Experience type

Mann-Whitney Test Statistics									
Directionality		L1 translation				L2 translation			
Experience type	N	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)	Mean Rank	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
UG	42	79.63	2441.5	-.74	.454	73.57	2187.0	-1.681	.093
PG	126	86.12		9		88.14			

Table 61 MWU test: Deletion ratio by Experience type

Figure 58 shows the effect of different levels of expertise on the deletion in different translation directions. The postgraduate group (Red) outweighs the undergraduate group (Blue)in both directions

in the total number of deletions and its ratio to the insertion number. Statistically, in the Del_number, the postgraduate group has a larger mean rank (85.39/ 88.66) than the undergraduate group with a mean rank (M=81.83 / 72.02) in L1 and L2 translation. No significant effect of the translation expertise was found in L1 translation (U=2534, p=.681), but a significant effect in L2 translation (U=2122, p=.055) was identified. Similarly, a larger mean rank has been found in the postgraduates group (86.12/ 88.14) than the undergraduates (79.63/ 73.57) in the deletion ratio in both directions. As suggested by the Sig, the difference between the translation expertise is insignificant in L1 translation (U=2441.5, p=.454) and significant in L2 translation (U=2187, p=.093). In sum, in the translation from Chinese to English, the postgraduates are doing more revision, indicated by the deletion number and ratio, than undergraduates to produce the target text. The finding partly agreed with the research of Jakobsen (2003), in which professional participants made more revisions than semi-professionals, while in the present study, the postgraduates, who are more experienced than the undergraduates, revise more than the latter. Furthermore, insignificant differences in L1 translation but a significant effect in L2 translation is probably due to, as mentioned before, the relatively more significant gaps in L2 proficiency between the two groups when producing English TT in L2 translation, compared to their L1 proficiency to produce Chinese TT in L1 translation.

5.2.2 Pause length and count

The lower threshold of “qualified” pause is set to be 500 ms and pauses shorter than this have been excluded from all the related calculations and analysis. By comparing the average pause length of individuals in each translation piece in the two directions, this section determines whether the pause pattern is significantly different in the two translation directions. Furthermore, it aims to compare the average length of pause (Pause_mean500) and the total number of pauses (Pause_count500) of individuals in two directions. Adopting GLMM data analysis would reveal the factors that influence the pause length in two directions and, most importantly, whether the allusion-related factors impact it. Given that the distributions of all metrics are positively skewed, the non-parametric test has been adopted to compare the mean, and GLMM has been applied to analyse the Pause_mean500 and Pause_count500.

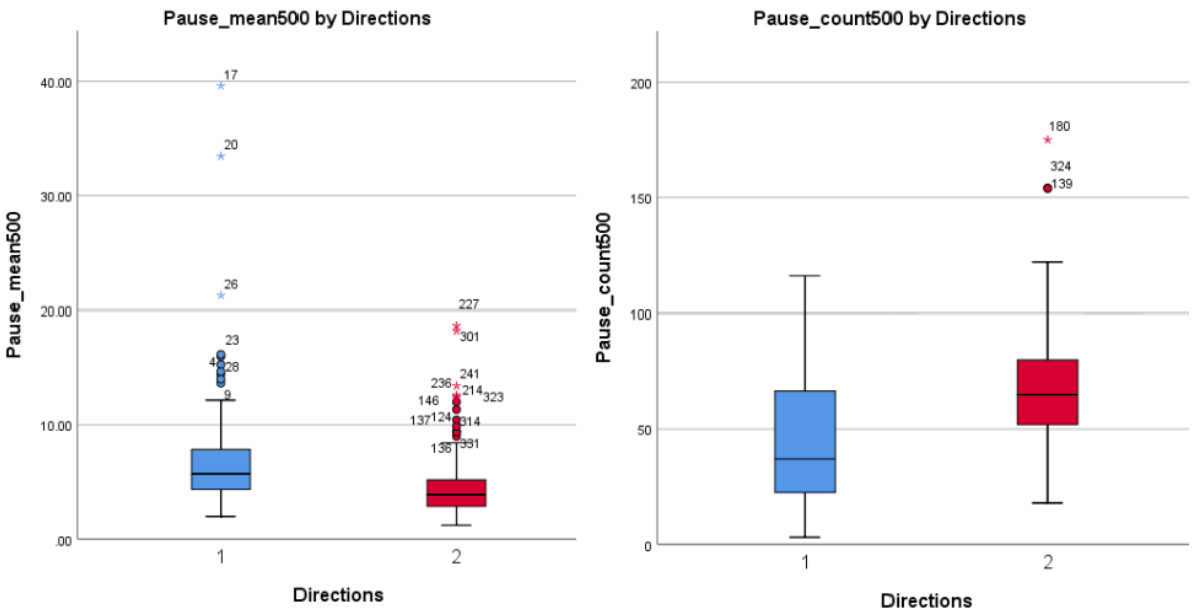

Figure 60 Boxplot: Pause metrics in two directions

Ranks				
	Directions	N	Mean Rank	Sum of Ranks
Pause_mean500	1	168	207.25	34818.00
	2	168	129.75	21798.00
	Total	336		

Mann-Whitney Test Statistics				
	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Pause_mean500	7602.000	21798.000	-7.312	.000

Table 62 MWU test: Pause mean in L1 and L2 translation

Ranks				
	Directions	N	Mean Rank	Sum of Ranks
Pause_count500	1	168	127.71	21455.00
	2	168	209.29	35161.00
	Total	336		

Mann-Whitney Test Statistics				
	Mann-Whitney U	Wilcoxon W	Z	Asymp. Sig. (2-tailed)
Pause_count500	7259.000	21455.000	-7.698	.000

Table 63 MWU test: Pause count in L1 and L2 translation

Figure 59 shows the comparison of average pauses between the L1 direction (blue) and L2 direction (red). It indicates that the participants seemed to have longer pauses on average in L1 translation than L2 translation, but more pauses have been made on the L2 translation than the L1. Statistics confirmed the assumption, as the average pause in the L1 direction is significantly longer than that in the L2 direction (M1=207.25, M2=129.75, U=7602.0, N=168, p=.000), meaning pause length during TT

production in English to Chinese translation is longer than that in Chinese to English translation. Conversely, the number of pauses shows a different pattern, in which the L2 translation required more pauses than the L1 translation during the TT production and reached a significant level (M1=127.71, M2=209.29, U=7259.0, N=168, p=.000). In other words, participants created fewer but longer pauses in the L1 translation when producing Chinese TT while having more but shorter pauses in the L2 translation when creating English TT. The finding, however, conflicted with those from Ferreira's research in 2012 (Ferreira & Schwieter, 2017), in which the pause durations were longer in L2 translation. The disparity between the results might be due to the difference in language pair and participants' translation expertise. Furthermore, the unexpected finding in the GLMM analysis reveals that the link between the pause and cognitive effort could be more complicated than assumed. If more pauses and longer pauses are all indicative of higher cognitive loading, then it might require further research to explain the conflict in the TT production between the two directions. However, Lacruz et al. (2012) showed more emphasis on the number of pauses than on their length and, to an extent, is consistent with the cognitive effort. In other words, the cognitive effort has a more direct relationship with pause count than pause length.

5.2.2.1 Cognitive Efforts and the Effects from Related Variables

The pause pattern of the participants in two directions has been identified, and it would be worth identifying which factors might contribute to the differences in length and count across two directions. The overview of the GLMM model and all the variables is shown below:

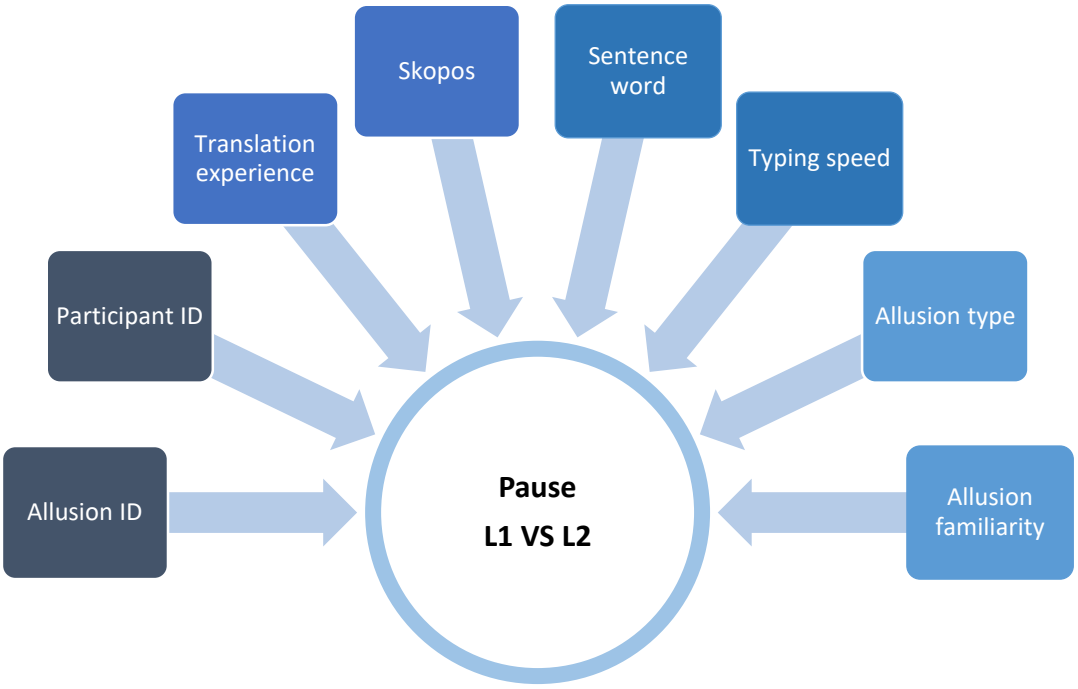

Figure 61 GLMM model for Pause in L1 and L2 translation

Like the eye-tracking GLMM model, this model was applied respectively in L1 and L2 translation based on the categorical variable Translation Direction. Table 62 summarises the test for effects in the GLMM model in which all the potential variables that potentially correlate to the pause length and number in two directions are listed. The statistic suggests that variables that influence the length and number of pauses are different in two translation directions. The experience type of the participants, the length of the ST sentence, and the degree of familiarity to the English allusion are proved to significantly affect the length of the pause in L1 translation when producing Chinese TT in general. In contrast, only the Skopos type in L2 translation was significant to the length of the pause. In terms of the number of pauses, Skopos type and ST sentence length affect the number of pauses in both translation directions, while the typing speed, allusion type, and allusion familiarity were found to impact the number of pauses in L1 translation but not in L2 translation.

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Source	F	Sig.	F	Sig.	F	Sig.	F	Sig.
Corrected Model	20.909	.000	244.801	.000	2.832	.012	27.888	.000
Experiences type	6.625	**.011**	.234	.629	1.238	.268	.064	.801
Skopos_type	3.290	.072	12.552	**.001**	12.122	**.001**	4.627	**.033**

Sentence word	71.816	**.000**	993.104	**.000**	1.006	.317	140.092	**.000**
TypingSpeed	.350	.555	4.005	**.047**	.010	.922	3.781	.054
Allusion_type	.017	.896	31.262	**.000**	.022	.883	.515	.474
Allusion Familiarity	68.145	**.000**	61.652	**.000**	.801	.372	.831	.363

Table 64 GLMM summary on pause metrics in the TT AOI in both directions

Sentence length

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Sentence length	-.018	**.000**	1.696	**.000**	-.007	.317	1.423	**.000**

Table 65 Pause: Sentence length in the TT AOI

As expected, the sentence length was positively correlated to the number of pauses; the longer the ST sentence, the more pause found in both directions. On the contrary, the ST length and pause length correlations are negative, significantly in L1 translation and insignificantly in L2 translation. In sum, the longer the ST length, the more but shorter pause was found significantly in L1 translation, and more pauses but not necessarily shorter pauses in L2 translation.

Allusion familiarity

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion familiarity	-.288	**.000**	4.820	**.000**	-.057	.372	1.088	.363

Table 66 Pause: Allusion familiarity in the TT AOI

Allusion familiarity has a positive correlation with the pause number in L1 translation. In other words, the more familiar the participants with the English allusion, the more pause or hesitation when producing the TT that contained the allusion, which is precisely opposite to the expectation. The same positive coefficient has been found in the L2 translation. However, no significant effect was found in the L2 translation (p=.363), meaning no difference between the Chinese allusion familiarity and the pause length. It should be noted that the degree of allusion familiarity also significantly affected the length of pauses in L1 translation. Thus in the L1 translation, it can be confirmed that the more familiar the participants with the allusion, the more and shorter pauses happened when producing the Chinese TT with the translation of the English allusion. Although the finding was unexpected, it

might indicate that the participants cannot recognise the unfamiliar English allusion but are very likely to translate it as a group of individual words, suggested by the larger number of shorter pauses. While for the L2 translation, the allusions written in their first language are easier to identify or understand. Thus, the degree of familiarity between Chinese allusion is not likely to affect the pause number and length during the comprehension phrase, but it did impact the process of translating into the English equivalence.

Skopos type

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Skopos_type =1	.081	.072	3.104	**.001**	.229	**.001**	-2.675	**.033**
Skopos_type =2	0		0		0		0	

Table 67 Pause: Skopos type in the TT AOI

The Sig. value of the pause count in two directions suggested that the skopos type proved to be correlated to the number of pauses made by participants in TT production in both directions (p=.001/p=.033). The positive coefficient showed when producing the Chinese TT to the outsider of the Chinese culture and language (type 1), more pause has been found compared to the production process to the insider or learner of the Chinese culture (type 2). In contrast, in L2 translation, producing the English TT to the outsider of the English language had less pause than to the insider of the English language. In the same direction, the skopos type was correlated with the pause length, longer pause on average for producing the English TT to the outsider of the English language than to the insider.

Experiences type

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Experiences_ type=0	.338	**.011**	-1.863	.629	.167	.268	1.331	.801
Experiences_ type=1	0		0		0		0	

Table 68 Pause: Experience type in the TT AOI

Statistics show that the experience type significantly affects the average length of pauses; however, this was only found in L1 translation. As can be seen from the positive coefficient for Type 0 (B=.338)

and comparison base Type 1 (B=0), it can be inferred that the undergraduates (type 0) maintained longer pauses on average than the postgraduates when they were producing Chinese TT in L1 translation. While for the pause count, none of the statistics in the two directions reached a significant level, meaning there is no significant difference between the translator's expertise and the number of pauses in either translation direction. Moreover, the negative coefficient of pause count in the L1 translation further proved that the relationship between the pause length, pause number, and cognitive effort is more complicated than assumed.

Allusion type

Directionality	L1 translation				L2 translation			
Pause-metrics	Pause_mean500		Pause_count500		Pause_mean500		Pause_count500	
Model Term	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.	Coefficient	Sig.
Allusion_type=1	.007	.896	6.613	**.000**	.011	.883	1.005	.474
Allusion_type=2	0		0		0		0	

Table 69 Pause: Allusion type in the TT AOI

Allusion type was correlated only to the number of pauses in L1 translation, and the positive coefficient suggested that producing the TT with PN allusion (type 1) contained more pauses than the TT with KP allusion (type 2). The same trend was observed in the L2 translation, but the statistic did not reach a significant level (p=.474). Compared to the number of pauses, none of the allusion types significantly affected the length of pauses in either direction.

5.2.3 Summary

Two hypotheses have been confirmed, and variables that significantly affect the length and number of pauses have been identified. Participants revised more often in L2 translation than L1 translation, and their pause patterns changed in different directions. Sentence word, allusion familiarity presented a significant relationship with both pause metrics in L1 translation while in L2 translation, only Skopos type correlated to the two metrics. Meanwhile, as noted earlier, the conflict between the pause length and pause count coefficient value indicated that the pause could have a more complicated relationship to the CE.

Hypothesis	**Result**
1. More revisions were made in L2 translation than L1 translation	Confirmed

2. The pause pattern is significantly different in the two translation directions	Confirmed

Table 70 Summary of the hypothesis for pause

Variable name	Pause length L1 translation	Pause count L1 translation	Pause length L2 translation	Pause count L2 translation
Experiences_type	Positive	Not significant	Not significant	
Skopos_type	Not significant	Leisure > education	Leisure > education	Leisure < education
Sentence word	Negative	Positive	Not significant	Positive
Typing Speed	Not significant	Negative	Not significant	
Allusion_type	Not significant	Proper name > key-phrase	Not significant	
Allusion Familiarity	Negative	Positive	Not significant	

Table 71 Summary of factors that influence the pause metrics

5.3 Quality assessment from the Target texts

As illustrated in section 3.2.5, this research adopted the PACTE acceptability model to assess the quality of the translation of allusion and how it was incorporated into the TTs. After the grading and revising procedure, the Acceptability score has been input into the SPSS for Mean comparison across different variables, including directionality, Skopos, allusion type and participants' expertise, and the scores from the three branches to find out the potential causes for the lack of acceptability.

Acceptability and Directionality

The table below presented the Mann-Whitney U test to compare the Mean difference of TT acceptability and three-dimension scores between L1 and L2 translation. It has been statistically proved that there are significant differences between the two translation directions in terms of the acceptability score of the TT. In general, TTs in L2 translation received significantly (p=.021) higher acceptability scores (M=192.47) than L1 translation (M=168.53). In the model, TTs in the L2 translation gained higher credits in both Meaning (p=.074) and Function (p<.001) dimension than L1 translation, significantly. The mean score in L1 translation (M=191.98), on the other hand, are significantly (p=.021) higher in the Language branch than in L2 translation (M=169.02).

Mann-Whitney U test

	Directionality	N	Mean Rank	Sum of Ranks
PACTE Acceptability	L1	180	168.53	30335.00
	L2	180	192.47	34645.00
	Total	360		
QA_Meaning	L1	180	171.45	30861.00
	L2	180	189.55	34119.00
	Total	360		

QA_Function	L1	180	163.36	29404.00
	L2	180	197.64	35576.00
	Total	360		
QA_Language	L1	180	191.98	34557.00
	L2	180	169.02	30423.00
	Total	360		

Test Statistics

	PACTE Acceptability	QA_Meaning	QA_Function	QA_Language
Mann-Whitney U	14045.000	14571.000	13114.000	14133.000
Wilcoxon W	30335.000	30861.000	29404.000	30423.000
Z	-2.317	-1.787	-3.397	-2.301
Asymp. Sig. (2-tailed)	**.021**	**.074**	**<.001**	**.021**

Table 72 Acceptability and Directionality

Suggested by the data, it can be concluded that, according to the PACTE's criteria, the TT from the L2 translation tends to be higher quality than the L1 translation in general. Adopting different criteria, the results conflicted with the previous research (e.g. T. Pavlovic, 2013) exploring the correlation between directionality and quality but were in line with that of Pokorn (2005) and demonstrated that the quality of the translation from L2 translation is no worse if not better than the L1 translation. Although L1 translation performed better in the Language branch to produce TT naturally and fluently than L2 translation, which coincides with N. Pavlovic (2007), the relatively lower acceptability score of L1 translation was largely due to the poor performance in understanding the Source allusion and in considering the functions.

Furthermore, by taking the cognitive data into account, it can be seen that the participants devoted more CE in the L2 translation than the L1 translation, and may contribute to a higher acceptability level in L2 translation than the L1 translation. However, although more CEs are allocated in the ST comprehension in L1 translation, the outcomes are not satisfying since the Meaning scores are relatively lower in L1 than L2 translation, indicating the participants have problems and incompetence in grasping the meaning of allusions. Similarly, although more CE, pause and revision have been found in the TT area in L2 translation, the participants are less capable of producing more fluent, logical and natural TTs in L2 translation. It is also interesting to note that the Function branch witnessed a significantly higher score in L2 translation than L1 translation, indicating that in the L2 translation, the participants are more aware and served better the Skopos, readership, genres, context in the TTs.

Acceptability and Allusion type

As shown from the statistic results, no significant difference (p=.501) in acceptability has been found between the types of allusion. In other words, the quality of translating proper-name or key phrase allusions witnessed no difference, although the trend seemed to suggest the translations of key-phrase allusions are less acceptable than those containing proper-name allusions.

Mann-Whitney U test

	Allusion type	N	Mean Rank	Sum of Ranks
PACTE Acceptability	Proper name	90	186.53	16787.50
	Key phrase	270	178.49	48192.50
	Total	360		
QA_Meaning	Proper name	90	200.14	18013.00
	Key phrase	270	173.95	46967.00
	Total	360		
QA_Function	Proper name	90	157.39	14165.00
	Key phrase	270	188.20	50815.00
	Total	360		
QA_Language	Proper name	90	190.67	17160.00
	Key phrase	270	177.11	47820.00
	Total	360		

Test Statistics

	PACTE Acceptability	QA_Meaning	QA_Function	QA_Language
Mann-Whitney U	11607.500	10382.000	10070.000	11235.000
Wilcoxon W	48192.500	46967.000	14165.000	47820.000
Z	-.673	-2.240	-2.644	-1.176
Asymp. Sig. (2-tailed)	.501	**.025**	**.008**	.240

Table 73 Acceptability and allusion type

Compared to the insignificant p-value in the acceptability, the two branches, Meaning and Function, all reached the significant level (p1=.025; p2=.008). The significant higher mean of the proper-name category (M=200.14) indicated that the participants could better grasp the meaning of the proper name than the key-phrase allusion (M=173.95). It also echoed the conclusion from the eye-tracking results. The participants tend to look up proper-name allusion, especially in L1 translation, and find well-accepted translation equivalence in the external resources, resulting in the less CE allocated in manually translating the allusions. Conversely, when translating the key-phrase allusion, the participants can better serve the functions in the TTs than the proper name, which is in line with more CE allocation to translate the key-phrase allusion.

Acceptability and Skopos

No significant difference has been found between the two Skopoi in general. A trend indicates that the translation for Leisure reading is of better quality than translation for Education, although the difference failed to reach a significant level (p=.317). Specifically, the p-value in the Function branch suggested that the translation for Leisure reading served the Skopos, readership, context and genres better than those for educational purposes. Again, in triangulating the data with the CE allocation, it can be inferred that since the participants allocated more CE in the Leisure reading Skopos for "outsiders", their TTs could serve better the functions required.

Mann-Whitney U test				
	Skopos	**N**	**Mean Rank**	**Sum of Ranks**
PACTE Acceptability	Leisure	180	185.67	33420.00
	Education	180	175.33	31560.00
	Total	360		
QA_Meaning	Leisure	180	176.18	31713.00
	Education	180	184.82	33267.00
	Total	360		
QA_Function	Leisure	180	208.91	37604.00
	Education	180	152.09	27376.00
	Total	360		
QA_Language	Leisure	180	180.98	32575.50
	Education	180	180.03	32404.50
	Total	360		

Test Statistics

	PACTE Acceptability	**QA_Meaning**	**QA_Function**	**QA_Language**
Mann-Whitney U	15270.000	15423.000	11086.000	16114.500
Wilcoxon W	31560.000	31713.000	27376.000	32404.500
Z	-1.000	-.853	-5.629	-.095
Asymp. Sig. (2-tailed)	.317	.394	**<.001**	.924

Table 74 Acceptability and Skopos

Acceptability and Level of Expertise

No significant difference in acceptability score between the two participants' groups has been found (p=.836). The result corresponds to the finding from the eye-tracking and key-logging analysis: seeing from the final production, there are no differences between the selected groups in translation competence or expertise. The reason could be that the gap between the two groups is not wide enough to reflect the significant difference. Nevertheless, it is also worth noting that in the Function branch, the Postgraduate group received a significantly higher score than the Undergraduate (p=.097), which could have suggested that the postgraduate participants can better fit the TTs into the functions provided than the Undergraduates.

Mann-Whitney U test				
	Experience	**N**	**Mean Rank**	**Sum of Ranks**
PACTE Acceptability	Undergrads	84	178.57	14999.50
	Postgrads	276	181.09	49980.50
	Total	360		
	Undergrads	84	173.88	14606.00

QA_Meaning	Postgrads	276	182.51	50374.00
	Total	360		
QA_Function	Undergrads	84	165.32	13887.00
	Postgrads	276	185.12	51093.00
	Total	360		
QA_Language	Undergrads	84	178.14	14964.00
	Postgrads	276	181.22	50016.00
	Total	360		

Test Statistics

	PACTE Acceptability	**QA_Meaning**	**QA_Function**	**QA_Language**
Mann-Whitney U	11429.500	11036.000	10317.000	11394.000
Wilcoxon W	14999.500	14606.000	13887.000	14964.000
Z	-.207	-.721	-1.659	-.261
Asymp. Sig. (2-tailed)	.836	.471	**.097**	.794

Table 75 Acceptability and Experience

5.3.1 Summary

Out of four hypotheses, only one been confirmed, in which the quality of TT, according to the PACTE model, is higher in L2 translation than L1 translation. To contrast, no significant difference in TT quality metrics, the acceptability level, between the allusion type, Skopos, and participants' translation expertise.

Hypothesis	**Result**
1. Higher TT quality has been found in L2 translation than L1 translation.	Confirmed
2. Acceptability level differed significantly between translating proper name and key-phrase allusions.	Rejected
3. Acceptability level differed significantly between translating for leisure reading and education purposes.	Rejected
4. Acceptability level differed significantly between undergraduate and postgraduate participants.	Rejected

Table 76 Summary of the hypothesis for quality assessment

Chapter 6 Translation strategies for allusion in both directions

This chapter aims to answer the research question: What strategies are used to translate PNs and KP allusions in two directions, and what factors might affect the decision-making process of choosing Translation strategies? Strategies that students resorted to during the experimental test have been qualitatively analysed following Leppihalme's (1997) summary of translation strategies on allusions, with as minimal changes made as possible. The source texts and corresponding allusions have been attached in the Appendix.

The retrospective interview (originally recorded in Chinese and translated by the researcher) has been transcribed and coded by Nvivo to review the strategies employed and the participant's reflection on the motive for choosing specific strategies during the process. The analysis and discussion of the results will be presented based on the category of the allusion: PN and KP allusions. Within each of the two categories, it will start with a brief overview of the frequency of the strategies calculated and a bar chart to visualize the differences in each direction, respectively. It will then compare strategies adopted in each translation direction, emphasising the potential factors that influenced the decision-making.

6.1 Strategies for proper name allusions

Leppihalme (1997) categorises the strategies applied to translate PN allusions into seven types. One of Leppehalme's categories, " replacing the name with an SL name", was omitted since none of the participants in either direction translation adopted this strategy. The six types that have been retained for the data analysis are shown in the table below:

1a use the name, retention without any guidance (Simple retention)
1b use the name, adding some guidance (Guidance)
1c use the name, adding the footnote (Footnote)
2 replace the name with a TL name (TL Replacement)
3 omit the name: omitting the name and the allusion altogether (Omission)
4 omit but rephrase, transferring the sense by other means (Rephrasing)

Table 77 Leppihalme's strategies for PN allusions

It should be noted that due to the morphology differences between Chinese and English, some lexical and orthographical changes have been made. Therefore, retention of the PN allusion did not work between Chinese and English translations. Transliteration between the Pinyin system and the English alphabet might be required for PN allusions. For instance, none of the participants chooses to retain

the PN allusion in the TT. Instead, they would transliterate the allusion or try to consult online resources for standard or existing translation of the names, which in most cases, are the transliteration of the names. Thus, the "standard translation/transliteration" has been included in the retention category in this research, although omitted by Leppihalme.

6.1.1 Translation of PN allusions: L1 vs L2

As can be seen in Figure 61 below, the most frequent strategy employed to translate the PN allusion in L1 translation is “Retention without any guidance (Simple retention)”, representing up to 55% of the total and triple the proportion of the second rank “Omission” with 17%. These are followed by “use the name with guidance and omit but rephrase”; 14% and 8% respectively. “Adding Footnote” accounted for 6 % of the total, and none of the participants adopted “replacing by another TL item” in L1 translation.

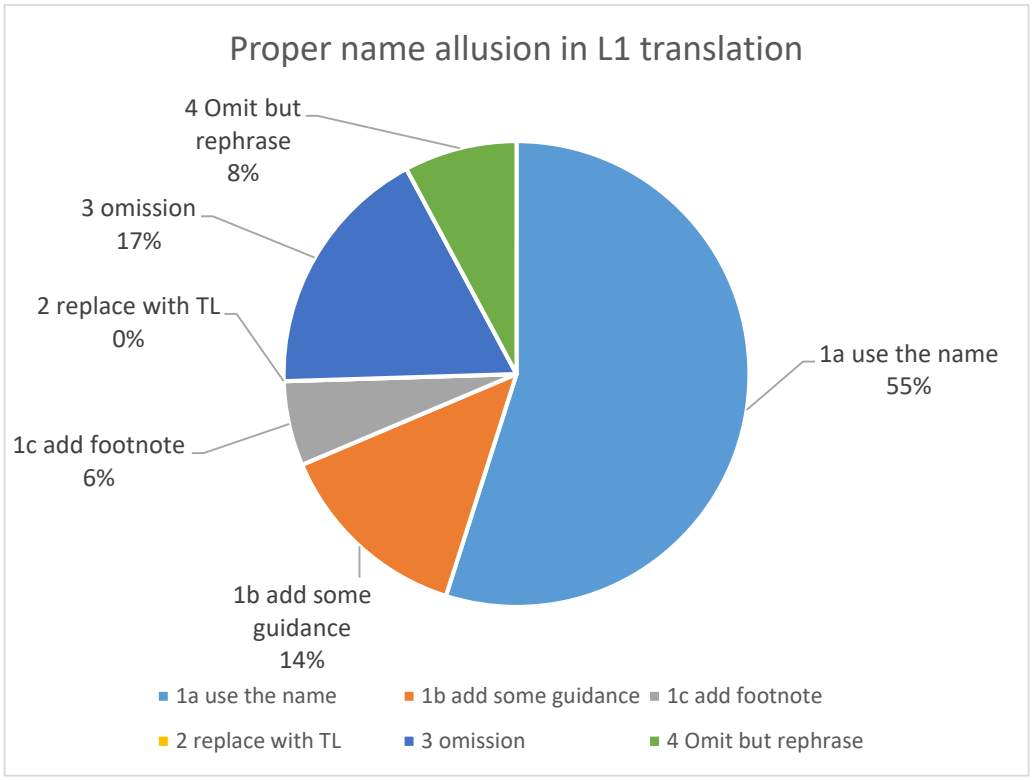

Figure 62 Strategies for PN allusion in L1 translation

In contrast, the distribution of translation strategies utilised for PN allusion in L2 translation is more concentrated than in L1 translation: the preference on strategies is more distinctive. *Omission but rephrasal* tops the list with 47% and surpasses the second most frequent strategy, *Omission* (25%). *Replacement with TL name* ranked third with less than half of the proportion of the second preference. 7% of the total Chinese PN allusion were translated by *Using the name with extra guidance*. Similar to the L1 translation, *Using the name as such* and *Using the name with footnote*

were least likely to be employed to deal with the PN allusion in L2 translation, 1% and 2%, respectively.

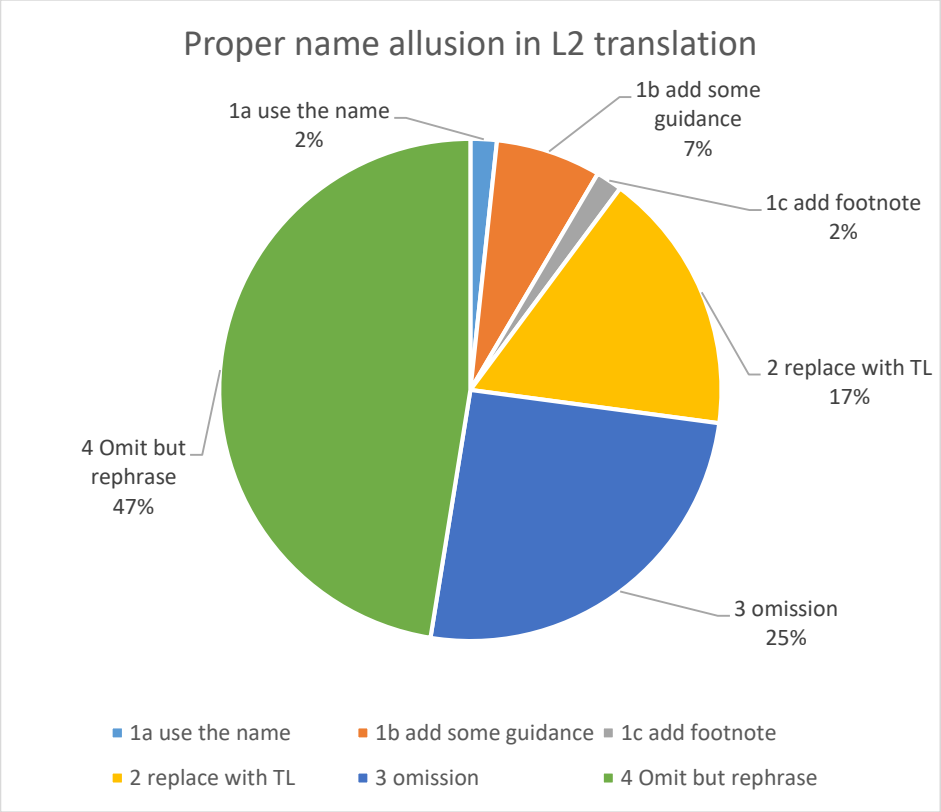

Figure 63 Strategies for PN allusion in L2 translation

6.1.2 Comparison across directionality

This section presents all the findings from the participants' retrospective interviews, commenting on their motives and reasons for choosing specific strategies. The findings have been summarised based on their translation strategies and compared between L1 and L2 translation.

6.1.2.1 Use the name, retention without any guidance (Simple Retention)

The most significant difference in the choice of strategies between the two directions is “Simple retention”. This strategy topped the list with more than half of the translators in L1 translation. As mentioned before, due to the orthographical differences between the two languages, entire retention of allusions cannot be achieved between the two languages; thus, Transliteration and Standard Translation or Existing Translation, as according to Roukonen (2010), has been included in this category.

Standard Translation and Existing Translation referred to those widely accepted translations found in the external resources which tended to be respected and adopted widely by other translators online. According to the student participants' interview comments, one of the reasons for consulting external

resources is their failure to recognise the allusion. The students who failed to recognise the allusion considered it as a new word they had never encountered before.

> *P24[13]: I searched for the word Cheshire, and thus I translated it as 柴郡猫 (Cheshire county cat)*
>
> *R: Are you aware of the Cheshire Cat?*
>
> *P24: I am not sensitive to the English allusion. I thought it was just a normal cat in Cheshire county since I searched Cheshire, which is shown as Cheshire county.*

and

> *R: Cheshire Cat, did you realise it was an allusion at first sight?*
>
> *P33: No, I thought it was simply a cat from a place named Cheshire. I did not realise it might allude to something.*
>
> *R: Do you know where it comes from? Are you aware of 'Alice in Wonderland'?*
>
> *P33: I cannot find the origin, and I did not watch the movie.*

Participants failed to recognise Cheshire Cat as an allusion since they treated it as a literal species of cat breed, not a fictional character, and consulted for external resources. P24 did not recognise the Cheshire cat as the PN at first sight but saw two separate words instead. Thus, P24 went through a typical process of searching externally for the unknown word Cheshire when confronting a new word as part of the translation process. Similarly, P33 did not realise that this term might allude to something since he/she is unaware of the referent of the allusion in fiction/as a character in a novel/film.

Apart from the few participants who failed to recognise the allusions, most of the participants succeeded in identifying the PN allusions compared to other phrases or words, even though some of them were not aware of the intended meaning or origin PN allusions.

> *P11: I knew Candide referred to a person, but I did not know the meaning. I did not want to make it wrong or over-translate it, so I used the one I found online.*

P11 presented an unconfident attitude towards his/her translation expertise, and thus P11 relied on external resources. More importantly, their external searching behaviour seems problematic in the way that he/she lacked the awareness to go one step further with external searching for the origin of the name and intended meaning, even when he/she realised that it was an allusion.

[13] P24 refers to Participant No.24; R represent the researcher

Transliteration was employed for a similar reason; translators were not entirely confident with their understanding of foreign allusions or failed to find satisfactory translations/explanations in the external resources. They kept the phonological sound of the name and left space for the readers to interpret by readers themselves. However, the weakness of this strategy is also apparent: the strangeness or foreignness of the source text remained in the target text. Therefore, it is unlikely that readers will fully comprehend the name's connotation without the allusion and the intended meaning.

Besides the incompetence in recognising and comprehending the allusion, some participants resorted to the standard translation driven by different rationales. For instance, the consideration of readership:

> *P32: I used the version of 老实人(an honest man) without mentioning the original novel. If I added the origin, I would definitely add some extra information to explain the origin so that the reader can understand. It would make the target text less fluent for readers.*
>
> *R: What about the Cheshire Cat?*
>
> *P32: I know about the background of this allusion, so I translated it with my knowledge. This literature work is very popular in China, and thus the image of a Cheshire Cat is quite clear to the Chinese readers. There is no need to mention the origin; the readers can immediately grasp the meaning when they read 柴郡猫 (the cat in Cheshire county).*

The interview response of the participant shows how the reader's perspective has influenced the translator's choice of strategies. When translating the PN allusion, P32 considered the readership when choosing translation strategies: whether they will understand the allusion and whether the choice of strategy might affect the experience of reading the target text. For the allusion like "Cheshire Cat", which the translator believed to be well-known for the target text reader, P32 is confident that the reader can still grasp the meaning, even though referent was not explicitly addressed.

In L2 translation, however, simple retention/standard translation/transliteration was applied by only one participant to translate the Chinese PN allusion into English. As shown from the L1 translation, the translators assumed that many Chinese target readers could be aware of some English origin PN allusions, such as "柴郡猫 (the Cheshire Cat)". However, none of them mentioned any potential for allusions of Chinese origin to be acknowledged by English native readers. Compared to the English language as a global language, the Chinese language is relatively less dominant to the English native reader. The translators assumed that the English readers could not understand Chinese allusions if

the allusion was retained or transliterated, considering the linguistic systems and cultures are distant from the SL and TL.

6.1.2.2 Use the name, adding some guidance (Guidance)

On top of the retention or transliteration of the name, translators add some inter-textual information for the TT readers who lack shared knowledge to hint at the connotative meaning behind the allusion. The difference between the frequency of using the guidance in two directions is not as distinct as the retention of the name but more diverse than the footnote. Although no case of this strategy was presented in Leppihalme's (1997) corpus, a small number of participants resorted to this strategy. Few participants explicitly stated their reason for using the inter-textual guidance in L1 translation, yet compared to the 1a and 1c strategies, it can be inferred that intertextual guidance is not likely to interrupt ease of reading but might be more concise and dense when added as footnotes.

> *P25: I want to add background to the allusion, and I do not want to add too much to interrupt the flow of the text, so I incorporated the author into the sentence, 'Candide in Voltaire's work'.*

In L2 translation, this strategy has been adopted in combination with another strategy: for instance, replacement. The participants used a TL item to replace the PN allusion, mostly a name from English culture to replace the Chinese name, alongside some inter-textual guidance to make explicit the implied meaning of the PN allusion.

> *P17: If I used the lame duck, the foreign reader could understand, but if I retain 阿斗(A Dou), the reader cannot understand。*
>
> *R: Then you added some explanation; why is that?*
>
> *B: Since it is for culture extension, I felt simply understanding is not enough. I need to let the foreign reader know its origin. Thus, I translated it into 'becoming the lame duck named Adou in Chinese historical stories'.*

and

> *P24: I kind of incorporated the two together, lame duck as Adou. I assumed the foreign reader might not know who Adou is, but if I simply replaced it with lame duck, it might lose the feeling of its Chinese origin.*

Both of the participants referred to the Skopos where the target readership or the purpose of the translation motivated the choice of incorporating two strategies to deal with Chinese PN allusions. P17 specified the purpose of culture extension to bring the readers closer to the ST and SC and explicated the origin and the story of the allusion by providing inter-textual information. Although not explicitly stated by P24, the issue both participants considered is to facilitate understanding for the

target reader and implied that through acknowledging the origin of the allusion, target readers could glance at the SC. Obviously, in both directions, the inter-textual guidance added to the text tended to be complementary information to the source material or referent of the allusion.

6.1.2.3 Replace the name with a TL name (TL Replacement)

17% of the PN allusions in L2 translation were translated by a replacement strategy, while no replacement strategy has been found in L1 translation. None of the translators mentioned any attempt at TL replacement in L1 translation or a reason for not choosing this strategy. It is somehow understandable since the participants reported their difficulties understanding the English allusion even before any attempts at translation strategies. Therefore, without proper comprehension of the English allusion, a TL replacement with the equivalent connotation can hardly be found. It is much easier for them to grasp the transliteration or standard translation of the PN allusion while comprehending the English allusion through external resources. Meanwhile, for two widely disparate cultures, replacement strategy does not work well in translating literary works.

Compared to English allusions, the participants can easily recognise and understand the Chinese PN allusions. Therefore, replacement with TL items was adopted by the translators - the motivation behind their choice varied.

> *P02: Since the readers are native speakers of English, I think their own expression would be better, so I used the Lame duck for 阿斗(ADou). Furthermore, if I chose to explain the allusion, the text would be too long.*

and

> *R: What is the reason for using Lame duck for 阿斗(ADou)?*
>
> *P33: I found an English phrase that has a similar meaning, and it is also an allusion. They are equal in many senses, like two characters in Chinese and two words in English.*

Two participants remarked about their motivations for choosing this strategy from two different perspectives. For one thing, in considering the target readers as native speakers of the TL, P02 believed that using an English allusion would suit better for the English native readers. In other words, it feels more natural for the readers to read the English allusion in a translated literary text, and naturalness is one of the critical qualities for translation. For another, P02 preferred the translation to be more concise and less explanatory, which indicated that the text stylistics could be one of the factors that influenced his/her choice of strategies. From a micro perspective, which is about the allusion itself, P33 focused on the attribute of the PN allusion. S/he tried to find the TL replacement with not only similar connotations but also the same attributes, such as allusion type and word

length. S/he emphasised the equivalence between the source PN allusion and the TL replacement from the cultural aesthetics perspectives to keep the stylistic format and the visualisation of the allusion and TT.

On the other hand, no replacement with another SL item has been found in either translation direction. It seems reasonable for the translator to reject the SL replacement after considering the distance between Chinese and English cultures and the considerably limited access of the target reader to the SC. The translators are required to understand the intended meaning of the SL allusion and find other appropriate SL items that carry the same or similar connotations that are more familiar to the target readers. Thus, they are expected to be acquainted with the degree of familiarity of the target reader with the SC to assess which replacement better fits in the target text and is more accessible to the target readers. For student translators as the participants in this study, the SL replacement might be beyond their expertise.

6.1.2.4 Omit but rephrase, transferring the sense by other means (Rephrasing)

The rephrasing strategy can also be seen as a kind of replacement in which the translator omits the ST allusion but replaces it with a non-allusive TL phrase that explicitly conveys the meaning of the allusion. It is also considered an implicitation, where a specific SL unit is replaced by a more generalised TL unit (Klaudy & Károly, 2005): the translators rephrase the ST allusion by dropping elements, which is the connotation of the allusion, in the TT. This strategy topped the list of frequencies in L2 translation with 47%, while in L1 translation, only 8% of the English PNs allusions were rephrased.

The participants reported that the Rephrasing strategy in L1 translation was closely linked to their incompetence in comprehending English allusions and searching for external resources. They attempted to incorporate their understanding of contextual information (allusion origin and explanation) from external resources. P02 below consulted external resources for the origin and explanation of the PN Candide; however, s/he rejected the transliteration of the allusion provided online since it neglected the referent and the cultural origin of the allusion. Instead, s/he analysed the context and interpreted the intended meaning from the allusion through the contextual meaning.

> *P02: I do not know who or what Candide is, so I did some searching online and found out that it is a character from Voltaire's work. I did not want to hastily use the one shown online since I had no idea about the reference or story. So I re-read the context and guess maybe it referred to an upright but blunt person.*

In L2 translation, much more rephrasing has been found to translate Chinese PNs into English. However, compared to L1 translation, the motivation to resort to this strategy is not a lack of comprehension of the allusion. According to the comments from participants, Skopos and the readership played a vital part in the choice of this strategy.

> *P02: I noticed that it is for entertainment, so I did not mention the origin or the background story of 阳春白雪 (YangChunBaiXue).*
>
> *P05: Since it is for a general reader, there is no need to explicitly explain 阳春白雪 (YangChunBaiXue). I did find the translation online, the spring snow. A Chinese source reader can hardly understand, let alone the English native speakers.*
>
> *P18: Based on the brief, the prospective readers know little about Chinese culture. So my goal is to make the target text readable to the readers, to focus on the consistency of the meaning.*

As observed from the interview, the participants favour the rephrasing strategy when translating the Chinese PN allusion for the general English reader. P02 chose this strategy, following the translation Skopos, for entertainment or leisure readers, while P05 and P18 addressed the readership of the text - for readers whom they assumed knew little about Chinese culture, and both rejected the transference of the semantic content and story in the allusion to give way to the TT structure and the implied meaning. Following the Skopos in the translation brief, the participants omitted the PN to avoid explaining the origin and story to the English general reader who (they felt) may have little knowledge of Chinese culture and rephrased the meaning with widely known phrases or nouns to maintain the readability and fluency of the target text.

Context is the other factor contributing to the choice of omission but transferring the sense through common phrases. P27 brought up how the context helped translate proper Chinese name allusions by incorporating the context information with the connotation of the allusion. S/he rejected the translation found online as it "sounds strange" due to the “foreignness” caused by the literal translation of a PN allusion. Based on the understanding of the allusion and the information from the context, S/he domesticated the allusion with a phrase meaning “expensive and exquisite items”, which is an antithesis of the cheap ceramics and jewellery in the context for a cohesive translation.

> *P27: I did find the translation of 阳春白雪* (YangChunBaiXue). *But I did not use that one; it sounds strange to me. So I kind of incorporated my own understanding of the text based on the context. To contrast the cheap ceramics and jewellery at the beginning of the sentence, this allusion referred to the expensive and exquisite items for sure. So I tried to find some synonyms.*

6.1.2.5 Omit the allusion (Omission)

Omission strategy here refers to the total omission of the allusion and its meaning. Although omission is a rarely used strategy in dealing with allusion (Leppihalme, 1997; Pirnajmuddin & Niknasab, 2011), several student translators in this research resorted to this strategy in both directions, with 17% in L1 translation and 27% in L2 translation.

The issue repeatedly related to L1 translation is understanding English allusions, which is also one of the triggers for participants choosing to use the omission strategy. A few participants tend to be conservative in their translation and omitted the allusion without any replacement.

> *P20: Candide, I did search for its meaning* 老实人 (an honest man), *but I do not understand how this related to the text. I mean, is it necessary to have this allusion translated? Moreover, I do not think I fully understand its meaning, so I chose to omit it.*

P20 directly expressed his/her concern about the incapability of understanding foreign allusions and how to incorporate them into the text. After external searching, s/he could link the allusion, Candide, to its referent in the intended meaning: an honest person; s/he, however, was still confused about the relationship between the allusion and text - "how this related to the text". As the TT reader, in the first hand accepting the rephrasing meaning, P20 failed to grasp the intertextual relation and the allusive power of the allusion from its rephrasal due to the lack of information linked to the source of the allusion. Without further looking at the background and the origin of the allusion, it could be difficult for the translator to incorporate the alluding part into the text properly.

P35 also chose to omit the allusion under the influence of the context, but from another perspective, the repetition of the phrases.

> *R: What is the reason for omitting the Cheshire Cat?*
>
> *P35: I knew the image of Cheshire, and it is a bit repetitive between the phrase 'grinning' and 'Cheshire Cat'. They are the same duplicate images to me. Furthermore, if the readers do not know about 'Alice in Wonderland', they will not know the Cheshire Cat.*

According to P35, the Cheshire Cat already has the image of grinning, and thus s/he believed the two lexical items "grinning" and "Cheshire Cat" are repetitions. As a non-native and student translator, s/he failed to recognise the phrase "grin like a Cheshire Cat" as a whole, an allusion in the English culture and thus treated it as two separate repetitions. In considering the readership of the text, s/he assumed the target reader might be unable to grasp the image of Cheshire Cat and therefore omitted the PN allusion completely.

In the Rephrasing category, readership or Skopos is the primary motivation for the participants' choice in L2 translation. The student participants unexpectedly and significantly considered the Skopos.

> *P16: If translating for the general foreign readers, I am unsure whether they have any similar culture images as* 阿斗(A Dou) *in English culture. If not, it is pretty hard to overcome the gap, and it is also quite long-winded if explicitly explaining the allusion. So I completely omitted it.*
>
> *P18: I did not translate* 阿斗(A Dou). *It would be complicated to explain this allusion; the story would go back to the Three Kingdoms in ancient China. It would definitely affect the readability and fluency of the text. It is for leisure reading, after all.*

Both participants in the example given omitted the allusion, 阿斗. The former, P16, pre-assumed the level of SC knowledge that the TT reader might have, and the latter, P18, considered the purpose of the translation. Besides considering Skopos and assuming that the reader would fail to recognise the name or story of ADou (阿斗), P16 also mentioned the possibility of a culture gap: the culture image in one culture does not exist in the other. If so, it would be much more challenging to fill the culture gap with the translation. P18, on the other hand, emphasises the readability and fluency of the text for the reader over the literary effect of the allusion within the leisure reading purpose.

6.1.2.6 Use the name, adding footnote (Footnote)

In both L1 and L2 translation, adding a footnote is the strategy participants employed the least to translate PN allusions. Compared to the Guidance strategy, the Footnote strategy increases the translators' visibility (Venuti, 2008): the readers are reminded, seeing the footnote, that they are reading the translated version instead of the original one. The majority of the participants rejected this option for the literary translation. However, although very few, those adopting this strategy claimed the following reasons for using the footnote.

> *R: What are the reasons for having a footnote here?*
>
> *P31: I assumed that the reader might not know what kind of person Candide is and why the author had this figure here. If I add a source here, it might be easier for the reader to learn about the book and the original character. And thus, they could better understand this sentence.*

and

> *P05: I added a footnote. The lecturer said that if something is related to a special item's background and you think it might be worth spelling it out, you can add a footnote to indicate the reference. I do not think the footnote has a significant impact on the fluency of the text; the reader can choose to or not read the footnote, can't they?*

Both participants brought up their awareness of readership when choosing this strategy for PN translation. More freedom has been given to the readers to find out more about the character's origin by providing a footnote. P05 has pointed out that this strategy was taught in their translation courses and emphasised by the lecturer to deal with a "special item" that carried a cultural referent. Both of the participants are very much in favour of extratextual gloss; the cultural referent of the allusion is given as a footnote to ensure that the reading experience would not be largely affected. They also expected that, through understanding the footnote, the reader could fully comprehend the source text; or choose to read on and ignore the footnote.

In L2 translation, it is the same participant who made the same choice and reasoned from the perspective of Skopos:

> *P05: I realised that this is the translation for the foreign readers who know Chinese culture, and thus I added a footnote to explain who 阿斗 (ADou) is, saying he is a weak Emperor and lost his kingdom in the end. I think the readers who are interested in the Chinese culture would want to know about it.*

Based on personal expertise and experience, P05 considered the target readership when choosing the strategies. When the Skopos stated the purpose of cultural learning, the translator made explicit the extratextual gloss and the cultural referent of the PN allusion by using a footnote rather than simply transliterating the name. The transliteration of the name, like A Dou, made little sense to target readers, but they may resort to reading footnotes for more information. S/he emphasised the necessity of sharing the origin of the allusion with the readers and assuming that they will be interested and want to know more through the information provided in the footnotes. In this case, this strategy would be welcomed by the reader who may have difficulty reading the target text but is willing to learn from the footnotes provided.

6.2 Strategies for key-phrase allusions

Slight modifications had been made based on Leppihalme's (1997) category of strategies to translate KP allusions. Two strategies, marked wording or syntax and recreation of allusions, have been omitted since none of the participants in either direction adopted those strategies. It is also worth noting that, although labelled and categorised differently, the strategies for KP allusions found high similarity with strategies for PN allusions. For instance, the strategies C, D, E, F, G all found identical correspondence in the PN section. According to Leppihalme's (1997) definition, the literal translation is a minimum change, similar to the 'Simple' retention for PN allusion.

A) Standard translation

B) Literal translation
C) Adding extra-allusive guidance (Guidance)
D) Providing additional information via footnotes (Footnote)
E) Replacement by a performed TL item (TL replacement)
F) Reduction of the allusion to sense by rephrasal (Rephrasing)
G) Omission

Table 78 Leppihalme's strategies for key-phrase allusions

6.2.1 Translation of Key-phrase allusions: L1 vs L2

Most of the participants for L1 translation translated the English KP allusion by rephrasing the allusion (F) with an overt expression of its meaning (47%). Literal translation (B) ranked second (18%), followed by 16% in replacement by a performed TL item (E). Six per cent of allusions were translated by adding extra-allusive guidance and standard translation and omission strategies reached the level of 5% each. Allusions were translated by adding extra information via footnotes (D) in a tiny number of cases (3%).

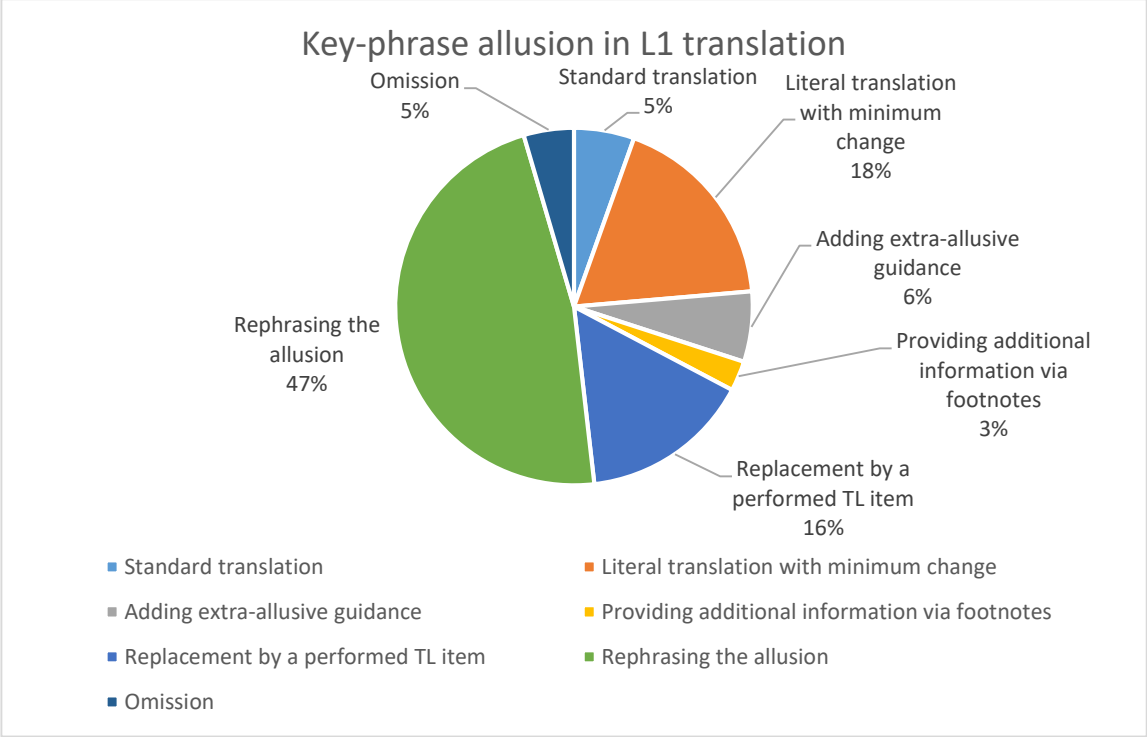

Figure 64 Strategies for KP allusion in L1 translation

As seen in L1 translation, the most frequently used strategy was rephrasing the KP allusion to translate it into Chinese; yet in L2 translation, the differences between the strategies became more significant. Two-thirds of the total Chinese KP allusions were translated using the rephrasing strategy,

followed by the replacement strategy (13%). More allusions were translated through the strategy Standard translation (12%) and far less the literal translation strategy (4%) applied, compared to L1 translation. None of the allusions was translated by adding footnotes; 3% were translated with extra guidance. 2% of the Chinese KP allusions were omitted.

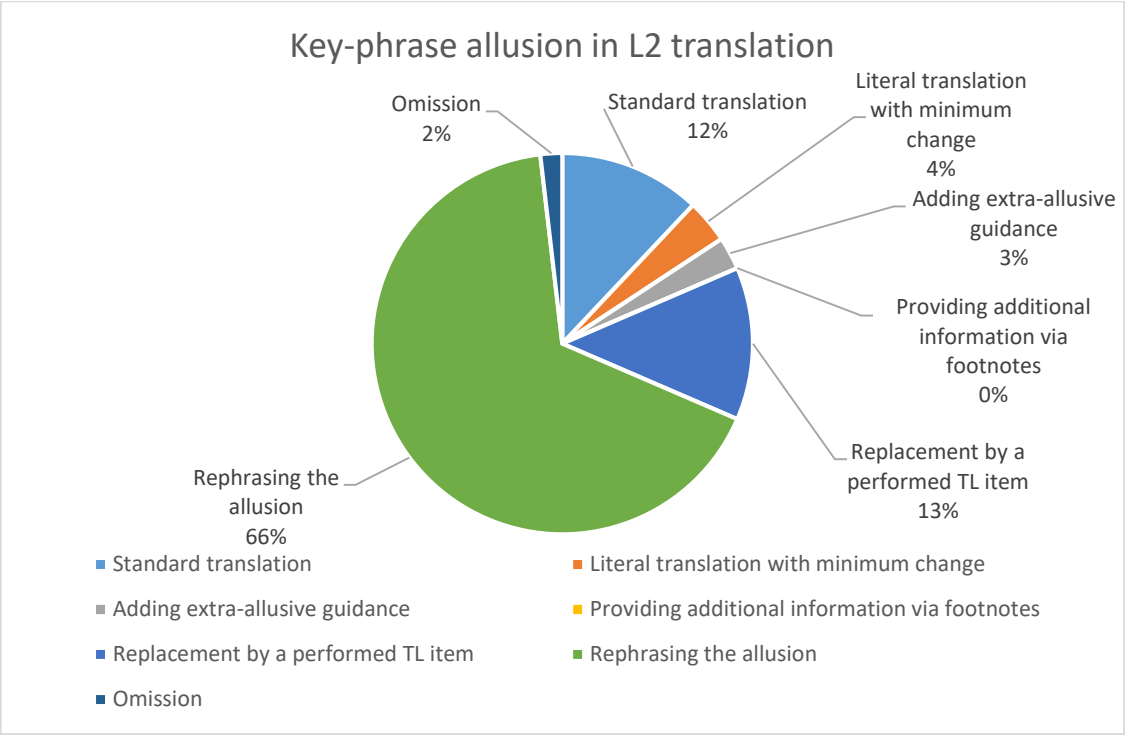

Figure 65 Strategies for KP allusion in L2 translation

6.2.2 Comparison across directionality

Compared to the PN allusion, the strategies for KP allusion show far fewer differences between the two directions. Participants resorted to the rephrasing strategy (F) more frequently than other strategies, regardless of the translation directions. Except for the literal translation with minimum change (B) and rephrasing (F) strategies, the frequency differences between the two directions were relatively small for all the other categories.

6.2.2.1 Rephrasing the allusion (Rephrasing)

The Rephrasing strategy (F) was most frequently used, with 47% of English KP allusions translated with this strategy in L1 translation. Like the rephrasing strategy in PN allusions, the motive for rephrasing the KP allusion is also linked to the lack of comprehension of English cultural allusions. Some participants even failed to recognise the KP allusions since most of the allusions of this type are not as distinctive as PN allusions with a capitalised letter or unusual spelling; instead, the KP allusions are potentially confused with non-allusive phrases for non-native or L2 speakers. P17 reported how their failure in recognising English allusions significantly influenced their understanding of the text:

> *P17: I did not realise an allusion here, 'beyond the pale', maybe? Failure to recognise the allusion had a significant impact on my translation. Unlike the previous translations in which I realised that there were allusions and could grasp the general meaning, the allusion in this sentence made no sense to me and thus made the entire sentence very difficult to understand.*

Even when successfully recognising the allusion, participants still struggled with the comprehension of allusions. Out of the 51 instances of rephrasing translation, 42 of those brought up their external searching behaviour in comprehension of allusions. P37 described the process of adopting a rephrasing strategy to translate the English allusion "Yellow brick road":

> *P37: I read the context first, but I didn't find any content related to the brick road or something like that. I felt it would be strange if I translated word by word, and thus I searched online. I found the background story of the allusion: The 'Wizard of Oz'; however, since I had no idea what the story was about and there was no time for me to read the outline in detail, I decided to translate it based on my own understanding of the text.*

P37 succeeded in grasping the semantics meaning of the allusion and searching for the allusion's origin but failed to interpret the implied meaning of the allusion, therefore initially trying to relate the context with “brick road” or the story of “Oz”. His feedback coincided with P02's, who adopted the rephrasing strategy to deal with the allusion Candide. They both incorporated their understanding of the context and information from external resources, mainly the story outline or origin, and then came up with an overt expression with reduced allusive meaning but preserved the propositional meaning. P37 finally translated Yellow Brick road into a Chinese phrase 光明之路 (a bright road), made the connotations overt but dispensed with the intertextual relation. S/he pointed out how the outline of the story contributed to a rephrasing of the allusion:

> *P37: According to the outline, it seemed like the road led the main characters to Jade city, where they wanted to go. So I think it referred to a road to the destination. It is a road to a bright future, I think, also in the context, it mentioned the excitement and happiness etc. I thought of adding the background into the text, but that would be too wordy and didn't fit the context.*

Similar conclusions have been found in Bahrami (2012) and Oh (2016). The former indicated that when the translator did not understand the meaning of the alluding part, they might pursue a way of making those connotations and senses overt in the translation; whilst the latter pointed out that when the cultural gap between the translators and the ST is too wide, a rephrasing strategy might apply.

Besides the comprehension of the allusion, the Skopos and readership played a vital part when the participants considered their choice of translation strategies.

P29: 'Beard the lion in his den', I think it should be an allusion, but I don't know the meaning. I looked it up online and found some Chinese allusions that carried similar meanings. However, I didn't use the Chinese allusion; instead, I paraphrased the meaning of the allusion, saying it is a courageous and determined deed.

R: Why did you rephrase the allusion?

P29: Considering that the prospective TT *readers are general readers, they cannot understand the allusion, even in their own language.*

After searching external resources, P29 found some Chinese equivalences that could potentially replace the English ST allusion. However, considering that the TT readership is the general readers who might be unaware of the Chinese allusion, s/he rejected those existing translations, abandoned the alluding part and rephrased the allusion as an easily understood phrase: 'a brave and determined deed', depending on the understanding of the allusion and prospective readership. Similarly, Oh (2016) summarised that in choosing the rephrasing strategy, translators would selectively deliver a part of the connotative meaning from the ST allusion based on their comprehension of the ST and the assessment of the TT reader's knowledge.

P02 also chose the same strategy as P29, although their readerships were very different.

P02: 'Beyond the pale' is the allusion here. It is for culture extension, so I assumed it is for some highly-educated readers. Therefore, I paid attention to the aesthetic aspect of the whole text and retained the same style of fictional dialogue as in the ST. Rephrasing the allusion would be the best and easiest option instead of the literal translation of the allusion.

Although adopting a rephrasing strategy might deprive TT readers of the aesthetic aspect of alluding, P02 is more aware of the style of TT as a whole. The Skopos for this piece of translation is for the cultural extension. S/he anticipated that the readers would be well-educated and thus tried to present the cultural aesthetics of the allusion and the text as well as to retain the stylistic equivalence in the TT. P02 and P29 both agreed that rephrasing the allusion into non-allusive words would be easier to achieve the goal than a literal translation of the allusion. Unlike P29's response, P02 presupposed the expectations of the target readers, highly-educated readers, to appreciate the overall style of the TT instead of a single allusion.

In L2 translation, the participants significantly preferred to adopt a rephrasing strategy (66%) to translate the Chinese allusion into English. Nevertheless, their primary motivation is not the Skopos or readership. Very few participants considered readership when they chose the rephrasing strategy. Compared to the thoughtful consideration of readership in L1 translation, the participants, when doing L2 translation, generalised all the readers into one group, regardless of the Skopos of the

translation. It showed that the Skopos, the purpose of the translation, had a very limited impact on this choice of strategy.

> *P17: I understand what this allusion 缘木求鱼 referred to, but I cannot translate it word by word, can I? Or it might be too difficult for the foreign readers to understand.*

and

> *P18：门外汉, I am quite familiar with this allusion, but I chose not to translate it word by word but rephrased it as 'not proficient'. It would be easier to understand.*

Some participants who chose a rephrasing strategy seemed to adopt rephrasing as an alternative strategy or coping strategy when they failed to find a suitable English equivalence for the Chinese allusion. Both P21 and P33 are confident in recognising the Chinese allusion and comprehending the intended meaning, as well as the intertextual relationship. They are willing to find a "corresponding English expression" to achieve lexical equivalence. With no approximate expression found, they chose to rephrase the allusion.

> *P21: The most challenging thing is to translate this allusion into English. I didn't find any equivalence. So I paraphrased the meaning of the allusion, 曲高和寡, as a complex and profound issue that difficult to understand.*

> *P33: 洛阳纸贵, I know it means very popular, but I didn't find any corresponding English expression, so I simply put 'popular' here. The next one is 曲高和寡, I can understand, but I found no corresponding English phrases, so I kind of rephrased it as a profound and unpopular thing'.*

In the translation of PN allusions, the context contributes to the choice of rephrasing strategy in L2 translation. In the L2 translation of KP allusions, context is also linked to the rephrasing strategy. P24 below tried to find an English equivalence online to replace the Chinese allusion, but all the found translations are the literal translation of the allusion. The transference of the semantic meaning would not fit into the TT since the literal translation of the allusion referred to a song, but the ST described an article. P24 chose to rephrase the allusion with only intended meaning left.

> *P24: 曲高和寡. I know the Chinese meaning of the allusion, but it is pretty hard to find the English expression. I looked it up in the online dictionary and found some expressions, but none of them fit.*

> *R: Why?*

> *B: All of the expressions are literal translations of the allusion. If you looked at the context, it described a difficult article that is hard to understand, but the allusion itself referred to a song that is too profound to understand. So the literal translation did not work in this case. So I chose to rephrase the allusion.*

6.1.2.2 Literal translation with minimum change (Literal translation)

The most significant difference in the choice of strategies between the two directions is the literal translation of KP allusions. 18% of English KP allusions have been translated into Chinese with this strategy, while only 4% use this technique in L2 translation.

Again, failing to recognise the allusion became the main reason for adopting literal translation with minimum change for the translators. Participants either failed to identify or misunderstood the KP allusion and thus translated the allusion with minimum changes. In contrast to PN allusions, KP allusions were more likely to be missed since they were treated as non-allusive phrases: Participants understood the prepositional meaning of the individual lexical terms in the allusion but failed to recognise the whole segment as an allusion. Both P03 and P16 failed to recognise 'Yellow Brick road' as an allusion, and consequently, both interpreted the allusion's semantic meaning as a road made with yellow bricks and translated word by word. P16 also addressed their failure to identify the allusion and their lack of cultural background understanding, which caused translation problems.

> *P03: For the 'Yellow brick road', I didn't realise that it was an allusion; I thought it was just a road made with yellow-coloured bricks.*
>
> *P16: 'Yellow brick road', I am a bit confused. Is it the road she built or not? I didn't look it up. It made the translation a bit problematic. Knowing the cultural background is quite important.*

Some participants resorted to a literal translation with minimum changes, based on other reasons, for instance:

> *P33: This sentence is easy to be translated, except for the 'old man of the sea'. I searched this allusion online and found an explanation: a person you cannot get rid of. I translated it because I found 'shake… off' in the latter part of the sentence.*

It can be seen that P33 recognised the KP allusion first but had problems grasping its meaning. After comprehending the interpretation of the allusion found online, s/he kept the literal meaning and abandoned the allusive meaning to avoid repetition in the referent, creating a more concise translation, since 'get rid of' and 'shake off' in this context express the same thing. Given that the context can make up for the connotative or contextual meaning of the allusion, the literary translation is applicable for the KP allusions(Oh, 2016).

The literal translation strategy has been applied far less frequently in L2 translation than L1 translation. Due to the minimal number of participants reflecting on this strategy in L2 translation,

only one kind of motivation has been reported by one participant. P18 took this strategy to avoid excessive extra-textual gloss affecting the target text's readability and resulting in over-translation.

> *P18: I searched the origin and the explanation of this allusion but only literally translated it because I'm afraid that if I explained the origin in the text, it would affect the readability of the TT.*

6.1.2.3 Standard translation

Unlike the strategies for PN allusion, Leppihalme's (1997) categorised standard translation as an independent strategy for KP allusion. Standard translation or existing translation (Roukonen, 2010) has been considered being an efficient and competent choice since it "requires no new verbalisation from the translator and, being transcultural, helps to convey the full range of meaning, including connotations" (Leppihalme, 1997, pp. 94-95). For student translators who have limited translation experience and cultural knowledge about textural allusions, a standard or existing translation could be an efficient and effort-saving choice for them. Both P06 and P27 (below) recognised the allusion first but still had difficulty understanding the intended meaning and the intertextual relation. Although recognising the allusion, P06 did not grasp the meaning of the allusion, and thus s/he searched external online resources for help with the meaning and the translation. S/he used the existing translation provided online as s/he was not confident in grasping the meaning of the allusion correctly for themselves. Similarly, P27 consulted external resources to confirm whether s/he mixed up the allusion in the ST with the one from Hemingway's work to avoid the mistranslation caused by misinterpretation of the allusion.

> *P06: Beyond the pale, I have no idea what it referred to, so I looked it up. It seemed to be referring to someone doing something unacceptable. I simply used the translation shown online.*

> *P27: The allusion in this sentence is the old man of the sea. The sentence is relatively easy. But I am not sure whether it is the man in Hemingway's work or something else. I checked it online and found it is not the same thing, and it referred to the god of the sea in some sort of myth.*

Like literal translation, standard translation has been deliberately chosen by some participants. P33 and P36 both researched the cultural background of the allusion, and P36 further remarked on their reason: for better understanding how the allusion and its origin fit into the sentence. They both eventually omitted the referent of the allusion to either maintain the naturalness and fluency of the TT or stylistics of the text. It also corresponded to what has been found in the PN allusion, that the text stylistics and the presupposed reading experience are factors for choosing specific translation strategies.

P33: I searched the background of the allusion 'Yellow Brick road' online and directly put the translation into the TT. I tried not to include the origin if not necessary, or it might sound unnatural and bumpy.

P36: 'Yellow Brick road'. I don't get why it is here, so I looked it up. I found out that it is from the story- 'The Wizard of Oz'. But I didn't add the origin into the TT because I didn't want it to influence the style of the text.

The participants' incompetence in delivering the ST allusion meaning into the TT is one of the reasons for choosing the standard or existing translation in L2 translation. P06 commented on their difficulty conveying the meaning of the allusions in the target language, which is an entirely foreign language in L2 translation. S/he found some examples for reference and chose one of the existing translations as their final decision. It should also be noted that s/he presented uncertainty ("I've heard of") in understanding Chinese allusion. P26 explicitly addressed the same issue and consequently used the existing translation online.

P06: 洛阳纸贵， I can understand the meaning, but I was not sure how to express it adequately, so I looked it up for some examples. The next one is 缘木求鱼, I've heard of the meaning of this allusion, but I don't know how to express it clearly.

P26: This allusion is 缘木求鱼。I didn't even know its Chinese meaning, so I directly searched it online and used the translation shown online.

6.1.2.4 Replacement by a performed TL item (Replacement)

As analysed in the PN allusion, none of the participants chose the replacement strategy in L1 translation. Nevertheless, in the translation of KP allusion, this strategy was chosen in 16% of total allusions. TL replacement strategy aims to remove the foreign element of the source allusion, replace it with a domestic one, and retain a sense of cultural reference. Therefore, maintaining the sense of cultural reference, or the cultural equivalence, is one of the motivations for choosing this strategy.

P21: I think the 'Yellow Brick road' has symbolic meaning from its origin. If I literal translated it, I would miss the symbolic sense. That is why I chose a traditional Chinese expression (康庄大道).

P21 pointed out that the “Yellow Brick Road” carried cultural and symbolic meaning from its origin. S/he favoured a replacement strategy over a literal translation, believing that the literal translation of the KP allusion might lose the sense it carried. Choosing a traditional Chinese expression, s/he maintained the symbolic sense and cultural aesthetic in the allusion and TT. P34 went one step further and focused on identical or similar alluding objects. For example, in order to translate the KP allusion “beard the lion in his den”, s/he firstly came up with several expressions that carried similar meaning to the source allusion, and then favoured one Chinese replacement over others, since the

selected one alluded to a tiger which corresponded to the lion in the source allusion, achieving cultural equivalence and maximising the cultural aesthetics of the TT. Although the translation did not achieve symbolic equivalence (Sawant, 2014), replacing a similar animal referent can be considered an ideal cultural substitution of the source allusion.

> *P34: 'beard the lion in his den', I looked it up. To my knowledge, there are similar expressions in Chinese culture. For instance, 太岁头上动土 (to leap on an earth god's head to make trouble) or 摸老虎屁股 (touch the backside of a tiger). I found the latter one suits this better. It has a similar animal image in the allusion.*

Skopos/readership is another motivation that participants repeatedly referred to. P05 explicitly pointed out that the readership for this translation as general readers is the reason s/he adopted the expression ("touch the backside of a tiger"). As a folk idiom, the expression can be understood by most Chinese people, who correspond to the readership of this translation. S/he struggled between TL replacement and rephrasing strategy. To maintain the connotation of the allusion or cultural reference as previously discussed, s/he finally resorted to TL replacement. P27, on the other hand, adopted the same strategy but found another expression to translate this allusion. Under the same Skopos as P05's, s/he also chose a folk adage to be accepted by the general Chinese reader. However, just like what has been observed in P34, the idea of identical or similar alluding objects certainly influenced their decision to find a Chinese adage with the tiger to correspond with the lion image in the source allusion.

> *P05: I translated the allusion 'beard the lion' in his den as 太岁头上动土 (to leap on an earth god's head to make trouble). It is a folk idiom and is completely understood by most Chinese people. The readership of this translation is 'common people'. That is why I used it. I thought of rephrasing it, but it might lose the sense of allusion if I rephrased it as being brave and bold or something like that.*

> *P27: 'beard the lion in his den', it seemed like an idiom or something like that. There is an image of a lion here, so I adopted the translation as 虎口拔牙 ('to pull a tooth from a tiger's mouth'). It is acceptable to the general Chinese reader since it is a folk adage in Chinese culture.*

The motivation in L2 translation to choose a replacement strategy was similar to those for the PN allusion. Although few participants mentioned the influence made by the readership and Skopos, they have remarked on stylistic equivalence, which is also found to be one of the motivations in the TL replacement of PN allusion. P31 hesitated between the replacement strategy and rephrasing strategy, just like P05's translation of "beard the lion in his den". In order to reach stylistic equivalence, S/he resorted to the replacement strategy to make sure that the replacement TL item was in a similar linguistic form as the source allusion ("the single word"). Meanwhile, P33 wavered between literal

translation and TL replacement and finally resorted to the latter one since, in their opinion, the TL replacement looked like the source allusion. In other words, this TL replacement, compared to the non-allusive word rephrasing, is similar to the source allusion in the way of structure and form: both of the two expressions are allusions and idiomatic expressions. It created a similar relationship between the two referents: blood and stone, like source allusion (fish and wood)—both two expressions referring to a pointless and frustrating deed.

> *P31: I struggled between the English word layman and rephrasing this allusion as I know nothing about it. I finally decided to translate it with the English word. 门外汉 is a single word, so it would be better to use a single word to translate it.*

> *P33: 缘木求鱼, I didn't know what it referred to, so I looked it up. I was not sure whether I should have literally translated it or used an English equivalence. I think an English equivalence (to get blood from a stone) suits better as they look more alike.*

6.1.2.5 Adding extra-allusive guidance (Guidance)

Six per cent of the allusions have been translated by adding guidance on the literal translation in L1 translation, which is double the figure in L2 translation. The main reason, according to the participants' feedback, is the consideration of the readership. P31 addressed their hesitation in using several strategies. S/he wavered between whether to be faithful to the original work, foreignise the TT with the target readers by having the referent remain, or be informative for the reader, to spell out the connotation and domesticate the TT to the readers. After anticipating the readers ' knowledge, s/he finally resorted to an additional strategy to retain the allusion and add the guidance for the connotation for the readers to grasp the origin and the intended meaning. S/he also pointed out that if used wisely, the guidance to the connotation could correspond with the context; Yellow Brick road in the story of Oz led to the adventurous trip, and it corresponded with the excitement in the following context, making the translation more cohesive.

> *P31: I was thinking about literal translation, but I was worried that the reader would not understand the intended meaning. They might misunderstand it to be a road with yellow brick. If I skipped the origin, the reader would miss something, but if I put the origin in it and used it wisely, it would correspond with the excitement in the context, creating a connection.*

Unlike what has been found in the PN allusion translation, where a guidance strategy was adopted in combination with other strategies, the added guidance strategy was not combined with other strategies. Nevertheless, the motivation for adopting this strategy remained unchanged: the Skopos. P25 added the paraphrased reference of the allusion into the translation owing to the Skopos for the cultural extension. Therefore, s/he believed that the source cultural background should be included in the translation. By adding the contextual information rather than directly explaining the allusion, s/he

emphasised the TT readers' correct interpretation of the allusion and its SC background by preserving both the allusion and the connotation together. This echoes the comment made by P17 in adopting the same strategy for translating the PN allusion and pointing out the essentialness of maintaining the source cultural origin for Skopos in translating for the cultural extension.

> *P25: I looked it up since I am not entirely sure if my understanding is correct. And I also searched its origin, like what kind of background it has. I paraphrased the background and put it into the translation.*
>
> *R: Why?*
>
> *B: It is for culture extension if I remember. So it would be better to have the cultural information involved in the translation.*

6.1.2.6 Providing additional information via footnotes (Footnote)

The strategy using footnotes to translate the KP allusion is the least frequent strategy participants resorted to, with only 3% of the allusions in L1 translation and none of the allusions in L2 translation. Translators who adopted this strategy, besides source-oriented ideology, justify the motive to "communicate all the nuances" (Maniacco, 2021, p. 13) of the ST with the new readers without any information unclear or missed, explicitly adding the allusion's origin to benefit the allusion's understanding. P31 stressed the allusive meaning and, similar to what has been found in the PN allusion data, emphasised the essentialness of comprehending the alluded origin to interpret the allusion itself and the benefit of comprehending the allusion to understand the ST and the SC. S/he presupposed that if the readers were interested in the allusion, they could search for more about it by themselves, and thus s/he provided extra-textual information through footnotes; More freedom of choice and understanding has been given to the readers.

> *P31: I added footnotes because I think the readers might want to know who the main character is in the allusion and how it related to the man in the context. That is why I explicitly spell out the background of the 'old man of the sea'. It will help readers search the origin of the allusion to have a better understanding of the allusion. The translator should let the readers know that it is an allusion. If just saying something like he is a person cannot get rid of, you will lose the sense of the allusion. But if you have it, the readers could look it up online if they are interested and develop their understanding of the source culture.*

6.1.2.7 Omission

Omission strategy also rarely happened in both directions, with 5% and 3% respectively. Although in similar frequencies, the motivation for choosing this strategy in two directions varied. The main issue that was repeatedly addressed by the participants who resorted to this strategy in L1 translation is their incapability of understanding culturally unfamiliar allusions, the same as in the translation of PN allusions. More specifically, P11 cannot understand the allusion and failed to find any external

resources to help, highlighting the problem of understanding the allusion. P12 confused the source allusion with another similar one and finally gave up translating it since it failed to correspond with the ST meaning, which shows a misunderstanding of specific foreign allusions. Lastly, P35 did not recognise the allusion "Yellow Brick Road" and considered the allusion a description of a typical road made with bricks, so s/he completely omitted it, which is the failure to identify the allusion.

> *P11: 'beyond the pale', I don't understand what it means and didn't find any explanation online.*
>
> *P12: I confounded the 'old man of the sea' with 'The Old Man and the Sea', and it made no sense. Now I realise that they are not the same thing.*
>
> *P35: I didn't think much about it. It was just a brick road to me, so I omitted it.*

Any issue related to the comprehension of allusion is not likely to be found in the L2 translation, and only one participant explained why s/he omitted the allusion. P10, to avoid the repetition of the meaning in the TT, omitted the allusion. According to their explanation, 缘木求鱼 referred to a fruitless approach, and the following context also carried the same meaning as the allusion. Consequently, the allusion has been removed to make the translation more understandable. It can be inferred that s/he tends to be more target-oriented in translation. S/he emphasised the reading experience and valued the fluency and readability of the TT over the aesthetic aspect of the alluding part in the ST.

> *P10: I omitted the 缘木求鱼, it referred to the same thing as the following context. It is more understandable without it.*

6.3 Discussion

According to Venuti (2008), the translators choose either a domestication approach to bring the author towards the readers and minimise the foreign text's strangeness to the TT readers or a foreignisation approach to lead the readers to the author. Detailed taxonomies of translation strategies based on Venuti's work have been introduced. Roukonen (2010), who summarised (1997) framework of allusion translation strategies, proposed the revised classification of retentive and modifying strategies to deal with allusions.

Retentive	***Standard translation***	1a) retaining the proper name in its conventional TL form A) standard translation of the KP allusion
	Simple retention/ Literal translation	1a) retaining the proper name unchanged B) minimum change of the KP allusion
	Guidance	1b) retaining the proper name and adding guidance

		C) Add extra-allusive guidance to the text,
	Footnote	1c) retaining the proper name and adding an overt explanation D) adding explicit explanations such as footnotes to the KP allusion
Modifying	***Replacement***	2a) replacing the proper name with another TL name F) replacement of the KP allusion by a preformed TL item
	Rephrasing	3a) replacing the name with a common noun G) reducing the KP allusion to sense by rephrasal
	Omission	3b) omission of the proper name I) omission of the KP allusion

Table 79 The revised classification of retentive and modifying strategies

Taking Roukonen (2010) framework for reference, the present research grouped the Standard translation, Simple retention/literal translation, Guidance and Footnotes under the Retentive strategies, whereas the Rephrasing, Omission, and Replacement as Modifying strategies. In the post-test questionnaire, participants have ranked the strategies based on the frequencies[14] taught in their training courses (grey) and applied in translation practice (purple); see Figure 65 below. It can be observed that the training on the translation strategies is slightly more target-oriented with modifying strategies in higher frequencies. For instance, the Omission topped the list with a high frequency (1.07) in taught courses, second by the Simple retention strategy (2). Participants are taught and more willing to apply more straightforward strategies, either keeping the allusion without any change or completely omitting the allusion. A dramatic decrease was found in the Footnote strategy in the translation practice, meaning the participants applied this strategy more often in the practice while the training on this strategy might be sufficient. All the other strategies did not present significant differences between the translation training and practice. Compared to the target-oriented preference in the translation pedagogy, multiple factors might influence the choice of strategies in the translation practice, and therefore, it would be necessary to identify those factors contributing to the participants' choices.

[14] From most frequent 1 to least frequent 6.

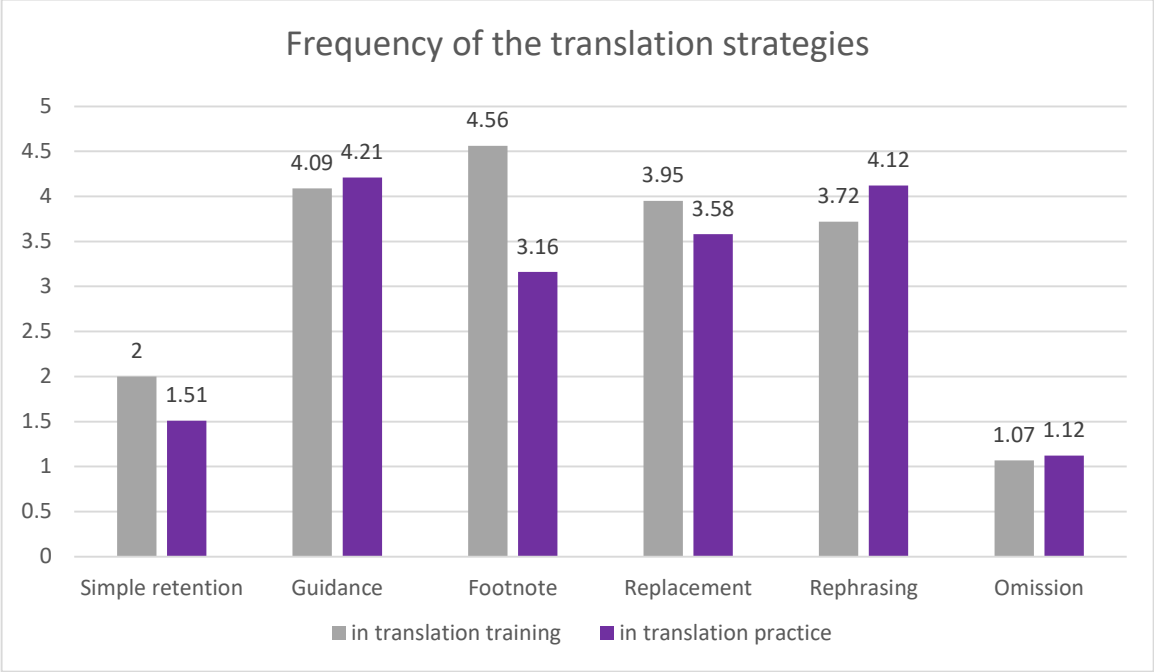

Figure 66 Frequency of the translation strategies in translation training and practice

It should be noted that the participants presented a generalised summary of the application of the translation strategies in translation training and practice, while the impact of the directionality and allusion types has not been identified. With the two categories involved, the trend of participants' preferences of the strategies is shown below:

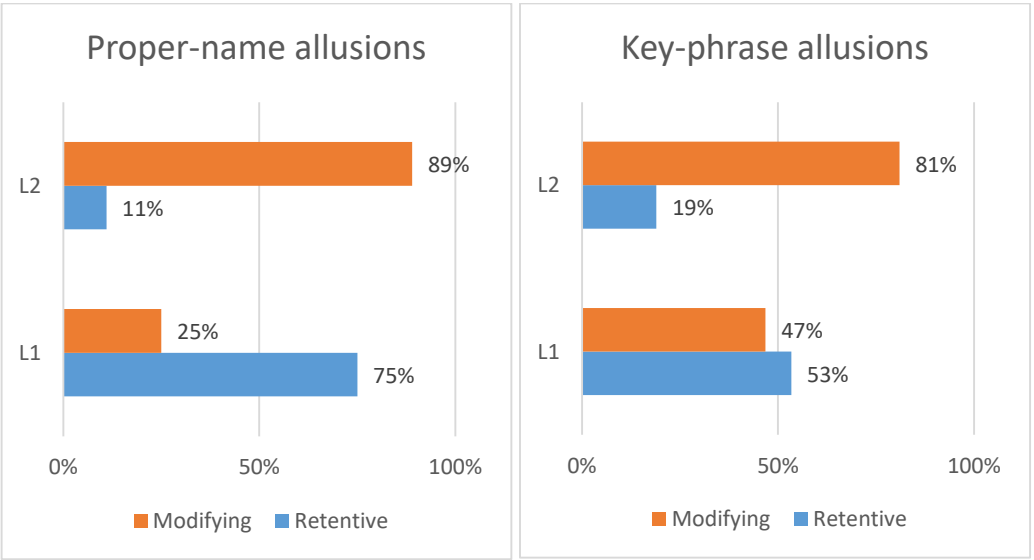

Figure 67 Participants' preferences of the translation strategies on PN and KP allusions

A distinctive preference for the retentive strategies is shown in the L1 translation of PN allusions with a ratio of 3:1 between the retentive and modifying strategies. The specific figures further proved that student translators in L1 translation resorted to the foreignisation approach, bringing the target

readers closer to the source text to enjoy the exotic connotation from the English PN allusion. While in L2 translation, they domesticated the Chinese name into the target context with modifying strategies applied to almost 90% of the PNs allusion.

On the other hand, although the trend was the same for the KP allusions, a split among strategies is less distributed than the PN allusion, especially in the L1 translation. In L1 translation, there is an increase in the preference of the domestication approach on the KP allusion, meaning cases adopting two approaches almost reached an equal level (47% to 53%). While in L2 translation, participants still favoured modifying strategies over the retention. This means that the translation of KP allusion in L2 translation is closely linked to the method of domestication in which translators aim to minimise the foreignness of the ST KP allusion to the TT readers.

The statistical test confirmed this conclusion with a Chi-square test run between the strategies type and translation directions. Given that the p-value is less than the significant level of 0.01, there is a relationship between the translation direction and the crosstabulation indicated in the L1 translation. The participants are indeed more source-oriented by adopting more retentive translation strategies in L1 translation. In L2 translation, they preferred to domesticate the allusions to fit into the target context.

Strategies types * Directions Crosstabulation

			Directions		
			1	2	Total
Strategies types	Retention	Count	108	41	149
		Expected Count	74.5	74.5	149.0
	Modifying	Count	72	139	211
		Expected Count	105.5	105.5	211.0
Total		Count	180	180	360
		Expected Count	180.0	180.0	360.0

Table 80 Crosstab: Strategies types * Directions

6.3.1 PN allusions

For PN allusions, very distinctive patterns of the participants' preference of strategies have been found between the two translation directions.

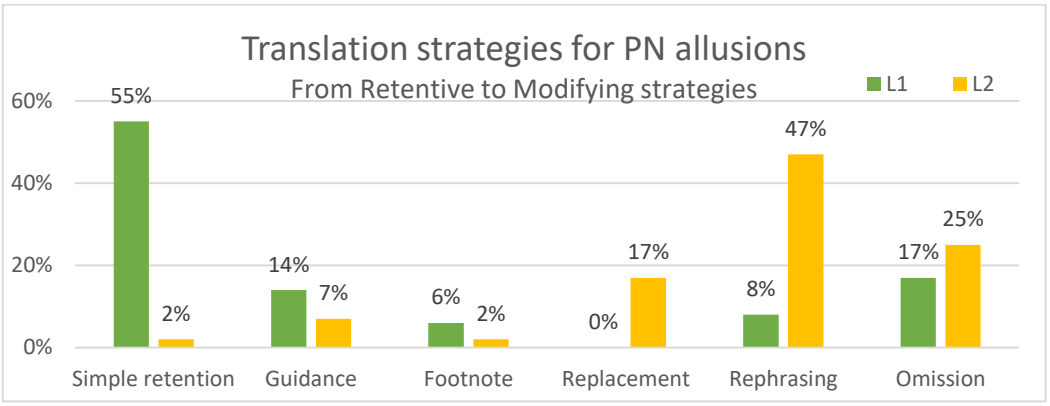

Figure 68 Translation strategies for PN allusions

In L1 translation, the participants are more likely to choose retentive strategies, either Simple retention (55%), Guidance (14%) and Footnote (6%). The choices significantly surpassed the application of Modifying strategies, including Omission (17%), Rephrasing (8%) and Replacement strategy (0%). These findings corresponded to those from Leppihalme's work, in which retentive strategies were applied for most cases in her corpus, with Omission and replacement occurring far less frequently. The preference for retention strategy in L1 translation revealed that the participants are source-oriented. Although some participants introduced extra glosses for target readers to better understand the English allusions, most of them are kept with their original form and were translated using the foreignization method.

According to the participants' interview, the main issue affecting their decision-making process of choosing retentive strategies is the incapability to recognise and interpret the allusions. Due to the lack of knowledge of English allusions, some failed to identify the PNs and thus transliterate the allusions into Chinese. Others either failed to understand the allusive meaning or are unconfident about their interpretation of the allusions and thus retain them with minimal change. Even if the participants can grasp various strategies to translate the allusions, without successful identification and interpretation of the allusions, their choices are still limited. In other words, they are not initiating the choice of strategy but resorting to a retentive strategy to avoid translation mistakes as much as possible and ensure the fluency and readability of the TT. It proved what Leppihalme's (1997) argues, the appropriateness of a strategy depends at least partly on the familiarity of the name. The same conclusion has been drawn from Roukonen (2010), in which the ST allusions were typically translated with a retentive strategy if they were culturally unfamiliar but more or less coherent in their context.

In the given interviews, some reflected that due to the difficulty of understanding the allusion, they turned to external resources looking for standard or existing translations of the PN allusions since it is believed to be more efficient and potentially maintained higher accuracy. They demonstrated that the existing translations are more appropriate than their translations. Finding from section 4.1.1.3.1 explains why the L1 translation is less cognitively effort consuming than the L2 translation since more participants resorted to the standard or existing translation as external resources. It is worth noting that the existing translation is not identical to the standard translation and not many of the translations have the status of a standard in the sense of being the most widely known TL version. This strategy seemed missed by Lepphihalme's model as a separate one, but rather it is incorporated into an existing strategy, like Simple retention. In the translation of the PN, most of the existing or "popular" translations of the names are the transcription or transliteration of the name. However, from a communicative point of view, the source orientation, e.g. simply retention or transliteration of the PN allusions, may result in arguably problematic target-text expression for readers who share no cultural knowledge of the source. The participants were transferring the responsibility of achieving equivalence in the translation to the readers: whether the translation would achieve communicative and dynamic equivalence through retention or transliteration depends on the assumption of prospective readers' cultural knowledge of the source. Only when they grasp the intended meaning of the translated PN or the transliteration, the TT readers may receive the same quality of message in the TT as the ST readers enjoyed in the ST.

In contrast, the Omission ranked second, with a higher proportion of PN allusions (17%) translated by this strategy. According to the participants, the difficulty of comprehending the allusion and the failure to use the resources they have accessed made them unable to interpret the covert meaning of the name. Thus, they opt to omit the name entirely to retain the fluency and readability of the TT. On the other hand, some participants intentionally chose to omit the foreign name to avoid repetition in the TT (e.g. P33 omitted the allusion "old man of the sea" in which the covert meaning had been restated in the context). Others considered the readership and the skopos of the translation: firstly, they demonstrated that little shared knowledge caused by the wide cultural gap between the source and its target readership made the cultural meaning of the PN allusion unreachable to the target readers of TT; secondly, the translation purpose was leisure reading, and translators emphasized the fluency and reading experience in the TT; thus, the translators entirely omitted the allusion to avoiding confusion when no better options were found based on their expertise as advanced student translators.

Compared to L1 translation, the participants' preferences on translation strategies are much clearer in L2 translation. All the Modifying strategies (marked in orange) are in the top frequent strategies applied to deal with PN allusions in L2 translation, with almost half of the Chinese allusions translated by Rephrasing strategies; a quarter of them was omitted, and the TL allusions replaced almost one-fifth of them. The modifying strategies (89%) largely surpassed the retention strategies (11%) in L2 translation; this is a more significant contrast than the differences in L1 translation. The preference for the domestication approach in L2 translation has been confirmed.

As seen from the diagram above, Rephrasing has been applied by most participants for L2 translation, followed by Omission and Replacement, which all belong to the modifying strategies. It shows an opposite trend than what has previously been found in the L1 translation, where the participants have frequently resorted retention strategies. The distinct diversity can be interpreted from participants' motivation during the interview about their decision-making processes when choosing strategies. This is different to the L1 translation in which the participants found the allusion comprehension issue primarily affected their choice of strategies; most of the participants had no difficulty understanding the allusion from their own culture. In L2 translation, they have been found to highly emphasize Skopos and the readership of the TT and take the translation brief as their priority when choosing strategies. They chose to remove the allusive meaning of the Chinese PN allusion when the scope of the brief of the translation focused on leisure reading for general readers since the unfamiliar PNs reduce the fluency. According to the participants, by adopting the Rephrasing strategy, they aim to reduce the foreignness of the translated literary work as much as possible by making explicit the covert meaning of the allusion and embedding it into the text. The domestication of the allusion by deleting the intertextuality embedded in the ST offers TT readers a natural and fluent reading as much as possible but at the expense of the connotation of the source allusion.

Replacement received much more attention in the L2 translation than in L1. For some participants, finding an appropriate replacement for the PN allusion seems to be their ideal and first choice when choosing strategies. Only when this failed in replacement, they would use other strategies. The choice for replacement strategy is also domesticated, in which the participants believed that by having an ST PN replaced by a target culture PN, the TT could be more natural and more accessible by the target readers. The replacement implies a change in referent, mostly an introduction of new referent, which is considered by the translators as more familiar to the TT readership. In the translation of "beard the lion in his den", P34 aims to reach a symbolic equivalent (Sawant, 2014) as much as possible and thus

the replacement TL item 摸老虎屁股(“touch the backsides of a tiger”) carrying the referent (tiger) is considerably closer to the ST allusion (lion) as an ideal cultural substitution.

6.3.2 KP allusions

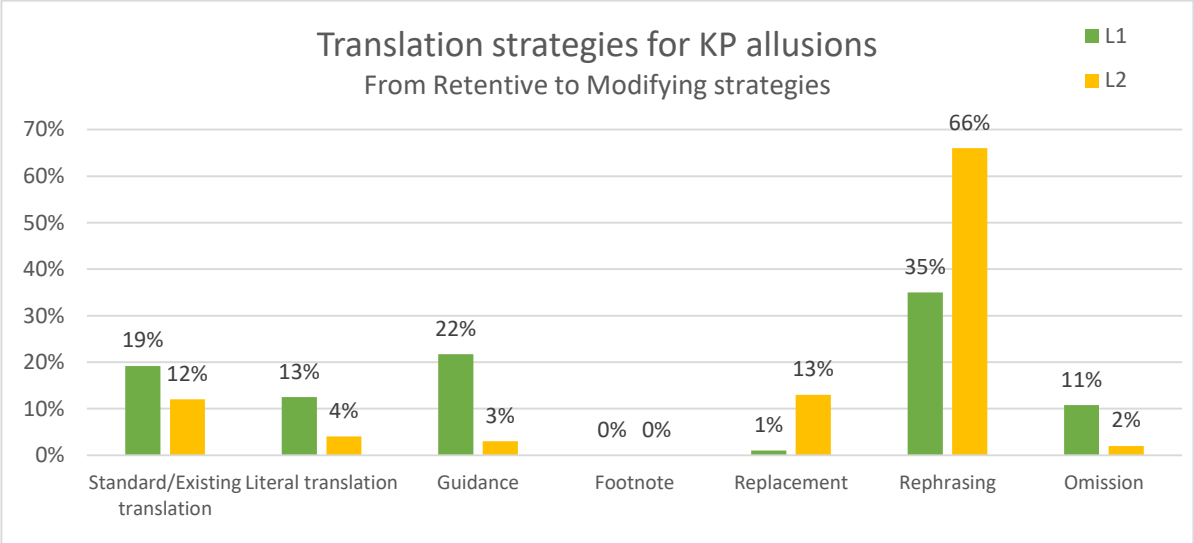

Figure 69 Translation strategies for KP allusions

In L1 translation, retentive strategies, including the standard/existing translation, literal translation, and Guidance, are widely adopted to deal with the KP allusion with narrow margins; the Rephrasing strategy, however, is one of the modifying strategies, took up 35% of the total. This result is different from Leppihalme’s (1997) findings on the translation strategies between English and Finnish in which the literal translation is dominant in the translation of the KP allusion, yet in the present study, more than one-third of the cases applied the Rephrasing strategy. The difference is attributed to the cultural distance between the ST and TT and the asymmetry in shared knowledge between the ST readers and TT readers, which is also found in Oh (2016), who looked at the strategies applied to translation allusions between Korean and English. In Oh (2016), translators added information to compensate for the loss of connotative meaning on the allusion rather than literal translation to reduce the culture bumps between the two languages. In the present study, the student translators similarly chose to reduce or remove the allusive part but preserved the informative function of the allusion. Besides limited translation experience and expertise that constrain student translators for a better solution to retain the allusive aspect, the language barrier and culture gap between Chinese and English are not easily overcome. With a minimal shared cultural background, and diverse linguistic characteristics between Chinese and English, the literal translation of the KP allusion can be problematic. Especially when translating for the general readers who know little about the SC, the

translators tend to remove the allusive meaning; for instance, with “beard the lion in his den”, they eliminated the cultural image of lion and den, presenting the intended information straightforwardly to the readers as "challenging someone".

The diagram above shows that the Guidance strategy has been much more frequently adopted compared to the L1 translation of the PN, surpassing all the other retentive strategies. It seemed like the merit of intra-textual gloss is more accepted by student translators for KP allusion translation: additional information is provided for better understanding and a minimum interruption to the flow of the text. The increase of the Guidance strategy suggested the explicitation in the translation. By inserting the intra-textual gloss, the participants supplement the TT with information that the translator considers necessary to improve the explicitness in the TT to the TL reader without downgrading the readability and fluency of the TT.

Modifying strategies dominated the L2 translation with the coverage of nearly 90% of the translation of KP allusions with a more considerable preference (66%) on the Rephrasing strategy, making it the most frequently used when translating the KP allusions, regardless of translation directions. The significant preference on the Rephrasing strategy might be due, according to the participants’ feedback, to the fact that many participants considered this strategy as an alternative strategy for Replacement or other strategies. Similar comments were never found in the L1 translation. Many of them explicitly stated that only when the other attempts failed might they adopt the Rephrasing strategy to ensure that the information implied in the KP allusion is correct since they can grasp the implied meaning of the KP allusion from their own culture.

Similar to the result presented in the L2 translation of PN allusions, the Replacement was the preferred choice for the participants to deal with the KP allusion. Although Replacement ranked second with only 13% of cases applied, participants claimed that when it comes to translating the KP allusion, they will try to find a replacement in the first place. Only when no equivalent or nearest phrase could be found would they try other strategies. Compared to the 1% application of the same strategy in L1 translation, the increasing usage of Replacement indicated that in L2 translation, when the allusion comprehension issue no longer constrains the participants, they might allocate more cognitive resources to consider the degree of equivalence in as many aspects as possible: from simply achieving the semantic and functional equivalence to achieving connotative, stylistic and cultural equivalence.

6.3.3 Factors that influence the decision-making

This section outlines the factors that impact the participants' decision-making to choose the translation strategies of allusion. Four factors have been identified, and findings also shed light on the translation competence and the awareness of student translators in dealing with a cultural reference like allusions.

6.3.3.1 Identification and comprehending of allusions

Al-Taher (2008) proposed a three-stage process to better relay the allusion across barriers of culture: identification, interpretation and translation (Al-Taher, 2008) and pointed out that the former two stages are dependent on the translator's level of awareness of the SC and the external resources may not be very helpful or comprehensive, especially in the first stage. Failure in the first two-stage would lead to the loss of the allusion's denotative and connotative meaning, which is always found among the student translators.

As suggested in 6.3.1 and 6.3.2, insufficient knowledge of the SC seemed to cause serious translation problems for Chinese student translators. In the pre-test questionnaire, most participants have ranked familiarity with the SC as an essential factor influencing the translation process. However, the results from the questionnaire also demonstrated that, in general, the participants presented negative views and lack of confidence in their expertise in English culture, with 18 % of the participants claiming that they do not have much knowledge of English-related culture, and 75% of them have knowledge of English culture only in specific areas. The survey on the understanding of the allusion also indicated that all of the participants had confronted difficulties in understanding English allusions, and 74% of them found this troublesome very frequently in the translation process. Furthermore, most of the participants (63%) are not confident with their knowledge of the English allusion, and 88% of them considered the allusion more challenging to deal with in the translation than the non-allusive terms. However, in contrast to the problematic issue, relevant training on the translation of allusion is insufficient. 71% of them received less than 50% of training in cultural translation, and more than half of the participants received less than 25% of systematic training in literary translation. Considering that 80% of the participants had no more than two years of translation training, literary translation training for the student translators is limited. Therefore, it is not surprising to find unexpected difficulties in comprehending relatively common allusions such as "the Cheshire cat" or "yellow brick road". The pre-test questionnaire also supported this finding with

News as the most common genre (6.86/6.08) the participants touched upon in their daily learning and translation work, while the Novel (5.02/5.75) and Poem (3.94/4.09) only ranked 4 and 6 respectively out of 8 options (See from Chapter 4).

The lack of cultural knowledge significantly influenced the participants' choice of translation strategies. Participants in this research have reported that due to the difficulty in understanding the intended meaning of the allusion, especially in L1 translation, most of them would retain the allusion as it is to ensure the originality of the translation for risk management, and a small number of them would even completely omit the allusion, making up the information's meaning from the context. However, it would potentially end up being problematic, that in the former situation, the TT would be extremely obscure to a fair proportion of the TT readers with foreign PNs involved, and in the latter one, the TT would not only lose the allusive power but more severely, lead a misinterpretation of the context without knowing the intended meaning of the allusion, resulting to a mistranslation. For instance, P24 and P33, who are unaware of the reference of the Cheshire cat and misunderstand the Cheshire cat as a cat from the county of Cheshire, gave a rendition of the allusion that suggested a positive attitude, which is opposite to the one in the ST.

There is a significantly high proportion of the Rephrasing strategy applied in the translation of KP allusions. Failing to grasp the covert meaning of the KP allusion, some participants had to omit the allusion and rephrase its informative meaning according to the contextual meaning. Although they acknowledged that it might not be the best choice, it might lose the chance for the target readers to enjoy the allusive power and have a high risk of mistranslation. Rephrasing the allusion was considered a relatively "safe" option when they failed to understand the allusion or were not confident with their understanding of the allusions, corresponding to Pym (2005), in which the application of explicitation can relate to the risk-management. Compared to the L1 translation, where the participants felt constrained by comprehension issues of the inter-textual element like, they were in a better position in L2 translation which went one step further to achieve more aspects of the translation equivalence as they are trying not only to achieve equivalence in meaning but also focus on the connotative, stylistic and cultural equivalence.

Many PN allusions and most of the KP allusions, not as distinctive as those with capital letters (e.g. Cheshire Cat) or particular referents (e.g. beard the lion in his den), are potentially hard distinguished from the non-allusive phrases. Difficulties in identifying foreign cultural allusions increased retentive strategies in translating both PN and KP allusion phrases. For instance, the failure to identify the allusion "Cheshire cat" as a whole led to an incorrect interpretation of the sentence. Several

participants misinterpreted the "Cheshire cat" as an everyday phrase "a cat from a place called Cheshire" and chose to literally translate the allusion, which eventually resulted in an inappropriate translation. Furthermore, in the translation of KP allusions like “yellow brick road”, the allusion itself has not been capitalized in the ST, neither did it contain unknown words to look up. Therefore, the participants who lack cultural background knowledge or do not know about the Wizard of Oz would end up failing to recognize it as an allusion that carried a covert meaning, and thus the referent of an adventurous trip in this allusion would not be revealed and received by the readers.

6.3.3.2 Command of translation strategies

It is to be applauded that, being pre-service or student translators, the participants are still relatively acquainted with different strategies to deal with allusions. As implied from Figure 69 below, over 80% of the participants can apply at least four kinds of translation strategies when dealing with allusions in two directions. Most of them can alter their choice of strategies according to different intra/extra-textual factors. Meanwhile, they are also flexible when attempting various translation strategies to find the most appropriate solution from the external resources, rather than sticking to one strategy. P02, P17, and P24 even incorporate intra-textual gloss with replacement strategies to translate the Chinese classical KP allusion for native English speakers unaware of Chinese cultural allusions. However, it should also be aware that 17% of the participant applied less than three kinds of strategies and 7% only resorted to two out of 6 strategies. Although the reason could be varied in the practice of allusion translation, the lack of strategies for researching the cultural allusion could potentially limit the tentative solutions to the translation problems they confronted when dealing with culture-specific references.

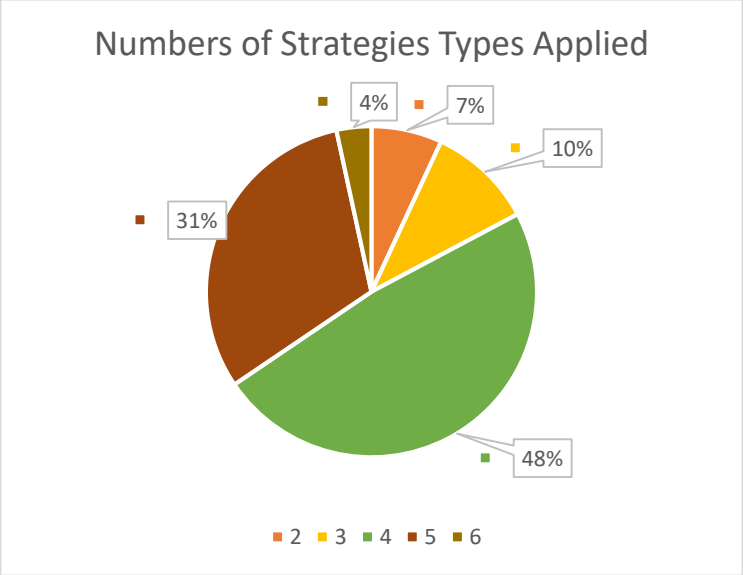

Figure 70 Numbers of strategies types applied by individual participants

6.3.3.3 The Contextual clue in the ST and the Fine-tuning of the TT

The context in the ST is one of the essential factors, as reported from both the questionnaire and the interview, influencing the decision-making translation of allusions. In the research of Olk (2001) on the translation of cultural references, however, student translators paid relatively little attention to the context that surrounded the allusion but rendered the reference in isolation. It is comforting that the student translators can regularly show awareness of the context in the present study.

Firstly, the contextual elements worked as clues to help participants identify the allusion or comprehend the meaning. The context would hint to the participants of the allusion, seen from the example of P37 identifying the allusion “yellow brick road” in section 6.2.2.1. Similarly, in the translation of the source text that contained the allusion “Old man of the sea”, P27 initially misinterpreted it as the allusion from the book of Hemingway, and it is the context that reminds her that her interpretation of the allusion is misleading.

In choosing the strategies, contextual clues also affect the participants' choice of translation strategies. In considering the context with the allusion, the participants would adjust strategies applied to translate specific allusions to avoid repetition or redundant context meaning in the final translation. For instance, P27 paraphrased the complicated Chinese allusion by transferring the sense and reducing the intertextuality and connotation of the ST allusion since the context can make up for the omitted information.

Throughout the retrospective report and the analysis above, the participants constantly mentioned the readability of the sentence, meaning that student translators have considered fine-tuning the style of the text in the translation of allusion in the literary work. Regardless of the translation direction and the translation approaches they resorted to, they always take the conciseness and clearness of the target text into consideration. The chart of Frequency of the translation strategies also shed light on this issue, for instance, the high degree of frequency of the footnote in their translation training courses compared with the relatively lower figure in their translation practice. Although it provides supplementary information and calls attention to the original works, the participants seem to value the TT's fine-tuning over the Footnote strategies. P18 worried that adding the referent of the allusion would harm the readability and fluency of the text, and P33 stated that "I chose not to use the footnote in the literary work, since it might affect the tune of the text".

6.3.3.4 Awareness of Skopos and Readership

The skopos and readership in the translation brief for the experiments aims to investigate how far the student translators respond to the different skopos and readerships in the strategies they adopt. As the retrospective interviews reveal, the consideration of the readership was not as frequent as expected in both directions given that a translation brief was presented at the beginning of each translation task to remind the participants: 16 out of 29 participants (55%) had assessed or speculated about the purpose of the translation of the ST and how much the prospective readers would know about the SC and the allusions. For those who have noted the translation skopos, the awareness of skopos and readership appeared to be highly influential to their decision-making process, and this awareness is a vital factor in their choice of various strategies. Translators have anticipated whether readers could be expected to understand a foreign allusion and whether additional information needed to be added, or whether the allusive meaning should be omitted.

The skopos awareness occurred in the early stage of allusion translation, often inseparable from readership awareness. Through the retrospective protocols from the participants, the process of the awareness affecting the decision of strategies was similar: after identifying the allusion, they define the purpose of the translation and the prospective readership in the first stage. They then speculate if the target readers would know the allusion: if so, a simple retentive strategy could be applied, with minimum changes; if not, additional information or further modification would be applied to the problem-solving process. Targeting different skopos, they would adopt different strategies: See from P17’s quote in Section 6.1.2.2 in comparison with:

P18: I omitted 阿斗(ADou)*. It would be really complicated to explain this allusion; the story would go back to the Three Kingdoms in ancient China. It would definitely affect the readability and fluency of the text. It is for leisure reading, after all.*

Both P17 and P18 translated the Chinese allusion 阿斗(ADou) following different skopos: culture extension and leisure reading. P17 retained the allusion with added Guidance since, following culture extension, P17 believed knowing the origin would be essential for the prospective readers. While P18, who omitted the same allusion due to the purpose of leisure reading, anticipated that the allusion would affect the readability of the text.

6.4 Summary

This chapter answered two research questions: a) What strategies are used to translate the allusion in two directions, and how do they differ according to the direction? b) what kind of competence and awareness could influence the decision-making of the choice of strategies? It presented the translation strategies participants adopted to deal with allusion in both directions, from both quantitative and qualitative perspectives. Through the text analysis on the TT, strategies have been identified and grouped into categories generated from Leppihalme's (1997) framework and Roukonen's (2010) classification of the strategies. Quantitative frequency tests have been conducted to see participants' preferences on the strategies across directionality and different allusion type. In general, the participants are more source-oriented by adopting more retentive translation strategies in L1 translation. While in L2 translation, they preferred domestication approaches to modify the allusions to fit into the target context. The conclusion has been confirmed statistically by the Chi-square test and reached the significant level of 0.01.

Meanwhile, the rationale and the reasons for choosing strategies have been distinguished from the qualitative interview of the participants reflecting on their translation procedures. The translation competence and awareness that significantly influence the decision-making of participants' choices have been summarised. Four main factors have been identified: the identification and comprehension of allusion, the command of translation strategies, the awareness of ST contextual clues, the TT readability, and the Skopos and readership awareness. Having student translators as participants, the discussion on the competence and weakness is expected to shed light on the translation training on allusions and other cultural references.

Chapter 7 Conclusion and Implications

This final chapter summarises the context of the research, the main findings, and how the findings help answer the research questions. Then it comes to the strengths and limitations of this research, along with the contribution and implications. Section 7.1 will illustrate the research findings and discuss whether they have successfully answered the research questions. Section 7.2 will demonstrate the contribution this thesis has made to the research field and its implications. At the end of the thesis, section 7.3 will address the limitations of this thesis and suggest possible directions for future studies.

7.1 Returning to Research Questions: Discussion of findings

The following section reviews the research findings and discusses how the findings answer the research questions. The overall aim of the study was to investigate the translation process of student translators in translating allusions in both directions. Two main research questions have been introduced in this thesis:

1) What are the impacts of allusion and directionality on the translator's allocation of Cognitive efforts (CE)?

2) What can be observed from the translation process of the translators dealing with allusions from and into their first language?

Allocation of CE revisited: L1 and L2 translation compared

The first analysis attempted to compare CE allocation between L1 and L2 translation. A sub-question of research question one was set to specify the matter further: would there be any difference in CE allocation when translating from and into Chinese, according to eye-tracking data and typing pause analysis?

The pre-test questionnaire indicated that most participants believed that the L2 translation tends to be more challenging than the L1 translation. By examining the gazing activities during the whole translation process in the two directions, the results from three primary cognitive-related indicators: task time, fixation duration, and fixation count, confirmed that the L2 translation is more cognitive demanding than L1 translation. Meanwhile, the acceptability score indicated that the L2 translation is generally of higher quality than the L1 translation.

In L1 translation, ST comprehension required more CE than the TT reformulation, and in L2 translation, TT reformulation required more CE than the ST comprehension. The result somehow proved the statement of Ferreira et al. (2016) that translators are more concerned with the ST. The results also emphasised the importance of ST comprehension: the participants would consider that understanding the ST is significantly more demanding than the TT production in L1 translation but feel the TT production in the foreign language is less challenging in L2 translation.

Translator allocates more CE to the external resources in L2 translation than in L1 translation has been confirmed. The conclusion conflicted with Ferreira et al. (2016) s' findings in which most of the participants spent longer fixation time in the browser during L1 translation; but similar findings can be seen in the research of N. Pavlovic (2007a), in which student translators in L2 translation rely more on external resources than in L1 translation. It is very likely due to the limited availability of external resources caused by the asymmetrical diffusion of language, according to N. Pavlovic (2007a). Pavlovic (2007) also indicated that there are likely to be more resources in dominant languages than non-dominant ones. Similar comments have been found in participants' verbal reports in the present thesis, in which they found a lot more material available on the Internet in English than in Chinese. They raised the issue that finding suitable English expressions for a Chinese allusion could be more difficult than directly searching external resources to comprehend an English allusion.

In terms of the key-logging analysis, the findings on the metric Time to the first keystroke confirmed that the ST comprehension in L1 translation is more cognitively demanding than L2 translation and the analysis on First to Last keystroke time suggested that the TT reformulation in L2 translation is more time-consuming than L1 translation. Seen from the deleted number and ratio, throughout the process of TT production, participants tend to do more revisions in the L2 translation than the L1 translation, which also indicated that L2 translation is more demanding to the student translators than L1 translation. Comparison on the average pause between L1 and L2 translation indicated that the pause pattern is significantly different between the two translation directions: L1 translation witnessed longer and fewer pauses, while L2 translation found more but shorter pauses. Besides the fact that the typing activities in Chinese and English are very distinctive due to the diverse linguistic structures, it might suggest that the processing pattern of the TT production in L1 and L2 translation could be very different.

Factors that influence the allocation of CE

Following the primary statistical comparison between the L1 and L2 translation, further investigation has been conducted on the variables that may affect the CE during the translation process. Two Macro AOI have been defined: The External Resources area (the browser AOI) and the Translating Interface area (ST+TT AOI). The second sub-question has been proposed: To what extent do the Participants' translation experience, ST length, Skopos, allusion type, length and familiarity relate to the allocation of CEs in two directions of translation?

In the External Resources area (the browser AOI):

Allusion familiarity has been found to significantly influence the CE allocated in external resources in both directions: the higher the degree of familiarity of the allusion, the more familiar the allusion to the Source Text reader, the less CE the translator devoted to the external resources. Since the allusion familiarity did not show any impact on the CE in the overall translation process, it might suggest that the participants' searching activities are closely linked to the translation of allusion.

Allusion types were found to impact the CE only in L1 translation, where more CE was allocated in the external resources by translating PN allusions than KP allusions. However, this impact was not found in L2 translation because of the failed identification of allusions. According to the retrospective interview, student translators can relatively easily identify the PN allusion as a culture-reference and look to external resources for clarification; however, a majority of them failed to identify the KP allusion and considered the KP allusion as a non-allusive phrase, translating the allusion word by word without any external resource consulting.

Experience type, the participants' level of expertise, was only influential to the CE paid in the external resources area in L2 translation. The postgraduate /advanced student translators are more efficient in external resources consulting than the undergraduate /junior student translators. The result shows that participants' efficiency in search of external resources is related to their translation experience: the more experienced participant, the more efficient it becomes in using resources. The result is in line with Zheng (2012), in which the usage of external resources reduced as the translation experience increased.

In the Translation Interface area (the ST+TT AOI):

Skopos type has significantly influenced the CE in both directions of the translation process: the translation for leisure reading to people unfamiliar with the source language required more CE in the translation process than translation for educational purposes to people who are willing to learn more about the language and culture. This conclusion confirms the claim from Pedersen (2005), who categorised the Skopos impact as a paratextual consideration, saying that whether the audience has particular knowledge of the theme is crucial for translators to consider. This claim has again been proved from the verbal reports of the participants. The consideration of readership and translation purpose appeared to be highly influential to the participants' decision-making, anticipating the readers' expectations of the TTs. Although not reported by all participants (55%), the awareness of Skopos has been subconsciously influencing the translators' cognitive processing.

The number of visits to external resources showed a significant and slightly positive correlation with the CE in both directions of translation, which means that the more visits made to external resources, the more CE is required for the translation process. The results partly confirm Michael Carl et al. (2016) finding that although the resources might help translators solve translation problems, this is at the cost of overall productivity. External resources might not always be efficient in lessening the cognitive load, and training for efficient external consulting strategies is required for student translators.

Allusion type significantly influences CE allocation in L1 translation but not in L2 translation in the translation process. In English to Chinese translation, dealing with PN allusions required less CE than KP allusion. Compared to the external resources AOI result, it is interesting that the participants tend to allocate more CE in finding external resources for PN allusion but devote less CE in translating the names. Besides the fact that student translators do not easily recognise some KP allusions, many English PN allusions are no longer covert and culture-specific. Consequently, well-accepted translation equivalence can be found in external resources, and less CE is allocated to translate the PN allusion than the KP allusion.

The GLMM on pause analysis suggested that ST length and allusion familiarity significantly impact both pause metrics in L1 translation, while in L2 translation, only Skopos type correlated to the two metrics. The conflict between the pause length and pause count coefficient value indicated that the pause could have a more complicated relationship to the CE.

Allocation of CE revisited: Allusion and non-allusion compared

The present research then focused on the smaller AOIs, which are the allusions. This section aims to answer the third sub-question: Would there be any differences to the allocation of CEs between comprehending allusion and non-allusive words or phrases, according to eye-tracking data and typing pause analysis?

Both the t-test and the GLMM analysis show that in L1 translation, allusion comprehension receives more CE than the non-allusion phrases, meaning that it is more challenging to understand allusion than non-allusion phrases, while in L2 translation, no significant difference has been found between comprehension of the two types. No up-to-date research explores the CE between allusion and non-allusion. Nevertheless, similar research has been done on the linguistic metaphor, which demonstrated that in the comprehension-related process, the expression type (linguistic metaphor) could significantly impact the CE in L1 translation but not in L2 translation (Wang, 2017). Wang (2017) also pointed out that in L2 translation, when the ST is easier to read, comprehending the metaphor in the first language is no more cognitively demanding than the non-metaphor. Therefore, the conclusions in the above section found considerable coherence with Wang's project.

Translation strategies for Allusions Revisited: L1 and L2 translation compared

This section aimed to answer the first sub-question of research question two: What strategies are used to translate the allusion in two directions? In general, the participants are more source-oriented by adopting more retentive translation strategies in L1 translation. While in L2 translation, they preferred domestication approaches to modify the allusions to fit into the target context.

In the translation of PN allusions, a very distinctive pattern of the participants' preference of strategies has been found between the two translation directions. The translators were showing the preference of source-oriented by adopting the retentive strategies in L1 translation. The operations of explicitation are not as frequently shown in L1 translation, suggested by the low frequencies in Guidance, Footnote and rephrasing strategies: Translators tend not “making explicit in the target text information that is implicit in the source text”(Klaudy, 2011, p. 104) in L1 translation. In L2 translation, all the modifying strategies are in the top frequent strategies applied to deal with PN allusions, which can be inferred that the translators are very target-oriented and prefer domestication in the translation of Chinese PN allusions into English. The high-frequency application of the Rephrasing strategy also indicated an increase of explicitation in the L2 translation, with the

intended meaning in the allusion being explicit in the TT, the complexed meaning in the ST is distributed over non-allusive words in the TT. It might suggest that although the participants have considered the Skopos, most of them still assumed that the TT readers have either relatively lower levels of knowledge of Chinese culture or less interest in engaging with it. The asymmetry diffusion of two languages could be a reason for this assumption.

Furthermore, participants considered Replacement as an ideal strategy for PN allusion, showing their emphasis on the connotation of allusions in the translation process. However, according to their reflections, the cultural knowledge, not only to the L2 but also the L1, limited their performance. They commented that even in their L1, allusion required more profound cultural knowledge and literary competence than non-allusive translation. For instance, a small number of participants reported that, in L1 translation, it is cognitively demanding to come up with the Replacement of the source allusion in their L1 culture, of which they should, but do not have sufficient awareness; in L2 translation, two participants had difficulties in comprehending the allusion from their L1 culture. It corresponds to the finding in the pre-test where a small number of participants are not confident with their L1 culture knowledge.

Meanwhile, the preference of the strategies to translate KP allusion is more complicated in L1 translation. The rephrasing strategy, which is one of the modifying strategies, appeared most frequently; but on the whole, the retentive strategies, including Simple retention, Guidance and Footnote, outweigh the modifying strategies with narrow margins. On the other hand, the preference of strategies in L2 translation is more apparent where the modifying strategies were highly favoured. In L2 translation, where they can grasp the implied meaning of the KP allusion in their own culture, they adopt a rephrasing strategy to ensure the information hindered by the allusion can be adequately expressed to the target readers.

Similar to PN allusion, Replacement was thought to be the first choice of strategies to translate the KP allusion in L2 translation, according to the participants, even though not many succeeded in finding the equivalence. Adopting the replacement strategy, they need to find an adequate equivalence of the source allusion, which would require a good command of cultural knowledge and literary competence in both L1 and L2. Except for those allusions that do not have adequate equivalence, the failure to find the Replacement could reflect two issues: firstly, their lack of knowledge in the allusions of both the L1 and L2 culture and secondly, the ineffective external searching behaviours in the external consulting process.

Translation competence and awareness influences

The translation competence and awareness that might influence the participants' decision-making in the translation of allusion and allusive sentences are summarised below. The student participants have shown specific translation competence and awareness during the translation process but weakness in other areas simultaneously.

The flexibility in applying strategies to deal with allusion can be observed from the participants. They can adjust the techniques, either implicitation (e.g. Omission to avoid repetition) or explicitation (Guidance for clarification), addressing their risk-management capability. They are also flexible in attempting various translation strategies rather than sticking to one strategy, even incorporating multiple strategies to translate the allusion and to minimise the effect on the readability of the TT.

The awareness of source context and TT readability can also be regularly seen from the student translators' performances. Some reported from the retrospective interview that the contextual elements worked as clues to help participants identify the allusion or comprehend its meaning by providing additional relevant information about the allusions and facilitating understanding. Moreover, contextual clues also affect their choice of translation strategies. The awareness of the readability of the TT is also constantly mentioned by the participants. Regardless of translation directions, they always considered fine-tuning the style of the text and paying attention to the conciseness and clearness of the TT.

The awareness of Skopos, however, was not reflected from all participants' verbal reports as expected, given that the translation Skopos was presented in the translation brief at the beginning of each translation task. Though, for those who have considered the translation purpose and readership, it appeared to be highly influential to the decision-making process. It supports the findings in Zheng (2008) that semi-professionals or translation trainees tend to resemble some professional's behaviours, for instance, considering the translation brief and translation expectation. Participants have anticipated whether readers could be expected to understand a foreign allusion and whether additional information needed to be added, or whether the allusive meaning should be omitted. Vermeer (2000) has pointed out that translators' choice of the translation strategy according to the Skopos of the target text is specified by the target readers' needs. Despite the cases in the L1 translation that participants have difficulties understanding the allusions, the process of skopos awareness occurred in the early stage of allusion translation, and the purpose and the readership are often inseparable. Through the retrospective protocols from the participants, the process of the

awareness affecting the decision of strategies can be summarised: after identifying the allusion, the translators firstly confirm the purpose of the translation and the prospective readership. They then speculate if the target readers would know the allusion: if so, a simple retentive strategy could be applied, with minimum changes; if not, additional information or further modification would be applied to the problem-solving process.

The insufficient knowledge of the source culture in L1 translation observed from the retrospective protocol resulted in many translation problems for the translators and significantly influenced their decision-making. Due to the difficulty in understanding the intended meaning of the allusion in L1 translation, most translators who struggled with the meaning devoted too much effort in the external searching and those without the ability to consult effectively misunderstood the allusion and ended up with mistranslation. The application of Simple retention, Omission and Rephrasing as "coping strategies" could be linked to the lack of cultural knowledge of SC (Zheng & Xiang, 2014). Those who are not confident of having understood the allusion would either transliterate the names or deduce the connotation of the allusion from the context. The transliteration of the foreign PNs would result in an obscure TT inaccessible to the target readers, and the inappropriate omission of the allusion would lose the allusive power in the TT for readers to enjoy the aesthetic style. Furthermore, insufficient knowledge of the L1 culture was found among a few participants, both from the retrospective interview and the pre-test questionnaire, which corresponded with the finding in N. Pavlovic (2007a). Understandably, the translation of allusion and allusive sentences required more profound cultural knowledge and literary competence.

7.2 Contribution and Implications

Theoretically, this thesis started the first step on a journey to investigate the translation of allusions systematically. With only a few studies that focus on allusion in the translation field (Bahrami, 2012; Dai, 2015; Hellgren, 2007; Ranzato, 2013; Roukonen, 2010, 2016; Tuñón, 2013), process-oriented research studies concerning the performance of the non-professional translator are even fewer. It is pioneering in looking at the cognitive effort in translating allusion and allusive sentences between English and Chinese and discussing the potential factors that might affect the process, drawing on quantitative and qualitative data. With eye-tracking and key-logging technology, this thesis confirms that allusion is more cognitively demanding than non-allusive expressions and the significant impact of allusion to allusive sentences. Thus, this thesis advocates the importance of researching the translation process of allusion and allusive sentences to convey the Chinese culture more efficiently

to the outside world by conducting more qualified literary and cultural translations. It demonstrated that the translation of allusion and allusive sentences required more cognitive effort, more cultural knowledge and literary competence from the translators. Therefore, the translation of allusion training should be emphasised in the literary translation and cultural translation courses. This thesis provides evidence for a more efficient and targeted training pedagogy. This thesis revealed that the most challenging issue for the student translators is the lack of cultural knowledge, mostly in their L2. Without a good command of cultural knowledge, translators would either fail to identify the allusion or be unable to grasp the intended meaning, leading to a mistranslation. Therefore, training on identifying allusions and choosing strategies to deal with them effectively is required to solve the difficulties of understanding them.

Moreover, the training to build up literary competence is also required for the translators in cultural and literary translation, both in their L1 and L2. The training on the awareness of source context and TT fine-tuning have received positive feedback from the students' performances. However, the awareness of Skopos still required further emphasis in the translation pedagogy. Lastly, both the GLMM analysis and the verbal report indicated that participants tend to have difficulties in effective external consulting on allusions' connotations, which require further training.

Meanwhile, different from studies that considered L1 translation as the default direction of translation research, this thesis advocated that L2 translation deserved the same, if not more, emphasis than L1 translation. L2 translators devoted more cognitive effort in translating and revising the TT in translation practice, and therefore, it is suggested that higher pay rates should be paid to the L2 translators. The proportion of L2 translation in the industry vastly surpassed expectations and showed a trend of L2 translation outweighing L1 translation. However, the academic research on L2 translation has not caught up with the practice. The thesis filled the gap by combing the directionality and the translation of allusion, exploring how the allusion/allusive sentence is translated in both directions. It pointed out the significance of L2 translation in cultural translation by revealing that the ST comprehension process in L2 translation costs far less cognitive effort than ST comprehension in L1 translation. This is especially true for translating cultural references like allusions, as the native translators of the SC who can better understand the ST should not be excluded from practice and research in this direction. Having evidence showing the strengths and weaknesses of L1 and L2 translation, the researcher could, therefore, propose the idea of collaborative translation, especially for cultural translation. Unlike the research of N. Pavlovic (2007a), which focuses on the collaboration of source language native translators to improve the quality of translation, this thesis believes that

collaborative translation could occur between the source and target language native translators. For instance, when translating Chinese literature in practice or for publication, one Chinese native and one English native translator could work together to compensate for the weakness of the other, efficiently producing a high-quality translation. Meanwhile, the setting of the bilingual corpora on English and Chinese allusion would be established in the translation practice, in which translators could find solutions to the translation of allusions, more equivalence for the allusions with less effort and time. Accordingly, the training on the corpora of allusion and allusive text is suggested to apply to the student translators at an early stage, starting from training on the effective external consulting behaviour to the application of corpora on the translation study.

This thesis also claims three methodological contributions. It could be the first study to combine eye-tracking, key-logging, text analysis and cue-based interviews to examine the translation process of allusions and allusive sentences. It triangulated the data in both quantitative and qualitative ways and came up with more convincing results. Furthermore, it introduced the Generalised Linear mixed-effect model to identify potential factors that might impact CE allocation during the translation of allusions and allusive sentences. The application of GLMM benefited the experiments to enable the random effects besides the fixed effects in the model. It adds validity to the findings based on the application of crossed random-effects models.

7.3 Limitations and Avenues for future research

This thesis focused on the translation of allusion in literary translation between Chinese and English, exploring cognitive effort in both directions of translation. Since no previous study was conducted on process-oriented research towards the translation of allusion, inevitable limitations existed due to objective and subjective conditions. Firstly, it is the recruitment of the participants. This thesis was conducted among student translators and found that the two groups did not witness a significant difference in translation expertise and experience. Thus, whether the findings can be extended to other groups of participants, for instance, the professional translators, remains in doubt. Secondly, this thesis focuses on one language pair - Chinese and English -which are culturally and linguistically distant from each other, and the Chinese language itself is relatively isolated from other Asian languages and Sino-Tibetan languages. Therefore, the present conclusion cannot be universally applied to other languages.

It is expected that future studies could extend the research and conduct more systematic studies in the field of allusion. The research can be replicated and expanded in the following ways:

1) **Extending participating samples:** Future studies are encouraged to replicate the experiment on different participant groups. The present thesis found its limitation in the recruitment of the participants when the two groups of the sample did not have significant differences in the translation expertise. Therefore, future studies can be conducted on samples like pre-service translators and professional translators to see whether the working experience and translation expertise impact their allocation of cognitive effort and choice of strategies. Meanwhile, it is worth finding out the factors that influence the professional translators' decision-making in the translation of allusion and how far it is different from the pre-service translators. Applying those data into the translation pedagogy can potentially equip the pre-service translators with the corresponding awareness or competence more effectively before entering the industry.

2) **Extending research on the External searching behaviour:** This thesis presented an overview of the CE allocation in the external resources in two translation directions. Future studies are suggested to look into the interaction between translation problem, consultation behaviour and translation directionality. Previous studies have been explored the correlation between translation problems, consultation behaviours and the cognitive load in a single translation direction (e.g. Cui & Zheng, 2020). More questions could be asked, for instance, how different directions affect the consultation behaviours' complexity in aspects of the type of resources and translation problems.

3) **Adopt different genres:** The research design can be replicated in different genres besides the literary text. According to the pre-test survey, the participants are more familiar with the news and political texts than the literary works, and the former two genres are also a major source of allusions. It would be interesting to explore whether the translators would adopt a different approach when dealing with different genres or whether translation of allusion is less demanding in the genre they are more familiar with.

4) **Using a different language pair:** The language pair adopted in this thesis is limited to only English and Chinese, two distant languages that distinguish from each other in origins, cultures and linguistic forms. If more language pairs can be involved, for instance, the languages share similar origins (English and Germany) or similar linguistic forms (Chinese vs Korean), it is worth finding out whether the culture distance or linguistic distance would affect the allocation of CE and choice of strategies.

5) **Introducing collaborative translation:** N. Pavlovic (2007a) has proposed collaborative translation to deal with directionality, which future studies can also adopt to investigate the cognitive processing and decision-making to translate allusions. For instance, recruiting both the L1 and L2 translators, future studies can explore CE allocation and the factors that influence CE between the two groups of translators. Data can be used to assess the feasibility of the collaborative translation of allusion in literary texts. Meanwhile, more attention can be invested in the process of consulting external resources, finding out how electronic database or CAT software help to improve L1 and L2 translation and the translation of allusions for efficient and satisfying translation, which would be expected to find evidence for the idea of collaborative translation between L1 and L2 translators/human and machine translation.

6) **Introducing a different quality assessment approach:** The present thesis focus on the translation process of allusions, while it is also worth investigating the topic from a product-oriented view. One of the possible suggestions for future studies is applying a reader-response questionnaire or interview to look from readers' perspective: What contributed to a high-standard translation of allusion, what kind of approach and strategy are more welcomed by readers with different reading purposes? The data from the reader-response survey can be applied to the analysis with Skopos theory to examine the readers' expectations on the translation of allusion under different Skopoi and to what extent the trainees can accurately anticipate the readers' expectations, following different readerships and translation purposes.

In terms of the methodology aspects, a development of the research method is encouraged for future studies. Research methods like fieldwork or classroom observations on teaching translation of allusion would provide new insight into translation pedagogy. The application of advanced data collection approaches like Functional Magnetic Resonance Imaging (Zheng et al., 2020) or Functional Near-infrared Spectroscopy (Lu & Yuan, 2019) to explore cognitive effort is also welcomed to cross-compare the findings from different technologies.

Appendix

A. Source texts and the allusions

Source text	Allusion
"Yanto Gates was not given to quick decisions or mad impulses, but the girl in reality matched his dreams of her so perfectly that he had to take it as a sign. She jumped visibly at his wolf whistle. She turned to see a very large handsome man holding out a cardigan and grinning like a Cheshire cat. She squealed with delight as she recognized him instantly."	Cheshire cat
Mid-Victorian traffic jams were quite as bad as modern ones-and a good deal noisier, since every carriage wheel had an iron tire to grate on the granite setts. So taking what he imagined would prove a shortcut, he plunged into the heart of Mayfair. The mist thickened, not so much as to obscure all, but sufficiently to give what he passed a slightly dreamlike quality; as if he was a visitor from another world, a Candide who could see nothing but obvious explanations, a man suddenly deprived of his sense of irony.	Candide
"老宋早把那两条人山人海的街走了几个来回，回来告诉凯西："不要指望。这种场合看好的是陶瓷和便宜首饰。你的是阳春白雪，太高了，没人响应。"果真不错。三三两两地也来了几拨人，客客气气地来，客客气气地走。温和礼貌地称赞着，却只是不掏钱。"	阳春白雪: the Spring Snow, a melody of the elite in the state of Chu in ancient China
"这时，山路上就只发现我与刚退休的老场长在一起。幸亏有他在，不用担心迷路。山月照在头顶，显得严肃和冷峻，仿佛在催促我们快步而行。然而我们的双腿如灌了铅般沉重，变成了"扶不起的阿斗"，肚子也饿得厉害，倒霉！山火发生的时间、地点都是不跟人们商量的。"	阿斗: the infant name of Liu Shan, the last emperor of the state Shu Han during the Three Kingdom period in ancient China/an incapable person who would not achieve anything even with significant assistance.
He is absolutely inferior to me in all ways. His one superiority is his ability to keep me here. That's the only power he has. He can't behave or think or speak or do anything else better than I can -- nearly as well as I can -- so he's going to be the Old Man of the Sea until I shake him off somehow. It will have to be by force. I've been sitting here and thinking about God. I don't think I believe in God any more.	Old Man of the Sea
As soon as she was heading out of Lower Axe towards the coast, she began to feel better. She switched on the car radio and hummed to the beat of the pop music. She began to feel young and amazingly pretty, like she had felt all those years ago when she had first emerged from the chrysalis of self-conscious adolescence to spread her butterfly wings. The road that led to the sea was her own yellow brick road leading to excitement and adventure. She laughed at herself, and at the extravagance of these thoughts, but she felt them nonetheless, and was, for the first time since the beginning of it all, truly light-hearted.	yellow brick road

She'd had little to drink tonight, perhaps two glasses of champagne all evening. Perhaps this was the result of an adrenalin-rush from all that anger. Yes. That was exactly what it was. She had just a minute or two to collect herself before Nicolo returned. You couldn't beard the lion in his den if you let your fears get the best of you. She wrapped her arms around herself and began to pace the room. Concentrate on something outside yourself, she thought.	beard the lion in his den
He read it in silence, then looked from his wife to his sister-in-law, and back to his wife again. 'So, I come home to find you plotting behind my back. What were you intending to do with this letter, Emily?' 'I came to ask Louisa's advice. You see, Tom sent it all the way from America, so I thought -' '' Perhaps I haven't made myself clear. Thomas Judge is no longer a member of this family. He has put himself beyond the pale -- I have forbidden you to speak of him.' 'He's still Florrie's son,' Louisa cut in gently. 'Florrie has no son! Don't you understand what I say? Thomas Judge does not exist.'	beyond the pale
"我便细细的盘问四弟，他始而吞吐支吾，继而坦白的承认他在热爱着那位姑娘，求我帮忙。我正色的对他说：“恋爱不是一件游戏，你年纪太小，还不懂得什么叫做恋爱。再说，她是个极高尚极要强的姑娘，你因着爱她，而致荒废学业，不图上进，这真是缘木求鱼！”"	缘木求鱼: to get fish from tree/a fruitless approach
"老江在文化界关系不错，他看了书后颇表欣赏。但他认为如果我想以写作维生，就应该迎合大众的口味，多谈些嬉皮的生活，外加一些性的描述。不要在书中讨论太多思想问题，否则曲高和寡，连找人出版都不可能。"	曲高和寡: profound and difficult songs find few singers/highbrow
"什么东西，一到奇货可居，万人争购之时，我对它的兴趣就索然了。我不大看洛阳纸贵 之书也不赴争相参观之地。当代画家，黄胄同志，送给过我两张毛驴，吴作人同志给我画过一张骆驼，老朋友彦涵给我画了一张朱顶红，是因为我请他向画家们求画。他说，自从这批“黑画展”以后，画家们都搁笔不画了，我给你画一张吧。"	洛阳纸贵: Push up paper prices in Luoyang city/sensational popularity of a new book
""“京剧这玩意确是迷人，”她接过茶，喝了一口，坐在沙发上，喘了口气，说，“你看，雪艳琴唱的多好，特别是那段二簧慢板，个个字都使腔，比西皮声调够味的多了，你说是不是？”老王对京剧是个十足的门外汉，但他谈起来却充满了浓厚的兴趣：“那当然，我一听京剧就舍不得走开。”"	门外汉: outsider/layman

B. Questionnaires

Chinese original version:

译语方向性: 探究译者在不同翻译方向中的翻译过程表现

译语方向性：指翻译时译者从自己的母语译成外语或外语译成母语。 母语译者/非母语译者：指译者是否为目标语言的母语使用者。 源语言/目标语言：待翻译的语言/ 翻译后的语言。

此问卷为本次博士生课题研究的第一阶段，如有兴趣参与本次试验后续的有偿笔译实践测试请留下联系方式手机号，微信，邮箱均可：_____。

1. 比较系统地学习英语有多长时间?				
5 年以下	**5 至 8 年**	**8 至 10 年**	**10 至 15 年**	**15 年以上**
2. 比较系统地学习翻译有多长时间?				
1 年以下	**1 至 2 年**	**2 至 4 年**	**4 至 6 年**	**6 年以上**
3. 日常学习中，中译英在整体翻译量（包括课程，作业等）中的比例接近：				
25%以下	**25-50%**	**50%**	**50-75%**	**75%以上**
4. 是否有过全职或兼职的翻译经验?				
无	半年以下	半年至一年	一年至三年	三年以上
5. 中译英在这段期间的工作量的比例接近?				
0%	**25%**	**50%**	**75%**	**100%**
6. 本人英语语言水平程度如何?				
非常不满意	很难完成翻译任务	勉强完成翻译任务	顺利完成翻译任务	非常满意
7. 目前对英语文化背景相关知识了解程度?				
很少了解	不会主动了解	只在特定领域熟悉	大部分都了解	非常了解
8. 本人中文语言水平程度如何?				
非常不满意	很难完成翻译任务	勉强完成翻译任务	顺利完成翻译任务	非常满意
9. 目前对中文文化背景知识了解程度?				
很少了解	不会主动了解	只在特定领域熟悉	大部分都了解	非常了解

10. 在过去一年中，最经常接触（日常休闲以及学习工作任务）的英语文体类型为? 按照程度对它们进行排序（接触最少为 1，最多为 8, 从未接触为 0）。

叙事小说	技术类专刊
诗歌散文	网络论坛文体
新闻报纸	影视歌曲文字
学术期刊	其他: _____

11. 在过去一年中，最经常接触（日常休闲以及学习工作任务）的中文文体类型为？按照程度对它们进行排序（接触最少为 **1**，最多为 **8**，从未接触为 **0**）。

叙事小说	技术类专刊
诗歌散文	网络论坛文体
新闻报纸	影视歌曲文字
学术期刊	其他: _____

12. 文化翻译课程及训练在日常学习课程中占比是

25%以下	25-50%	50%	50-75%	75%以上

13.文学作品翻译课程及训练在日常学习课程中占比是

25%以下	25-50%	50%	50-75%	75%以上

14. 作为中文母语者的我来说，中译英和英译中的难度比较：

中译英更难	多数文章中译英难	差别不大	多数文章英译中难	英译中难

15. 中译英时即使源文是我的母语，我在理解上也会遇到困难。

从未	很少	偶尔	有时	经常

16. 英译中翻译时即使目标译文是我的母语中文，也会生硬不自然。

从未	很少	偶尔	有时	经常

17. 我认为中译英只能英语母语者来做。

强烈反对	比较反对	中立	比较同意	非常同意

请写出原因：

18. 我认为与英译中相比，中文母语译者在中译英翻译会有更好的表现。

强烈反对	比较反对	中立	比较同意	非常同意

请写出原因：

19. 我认为优秀的译者无论在哪个方向的翻译都可以做的很好，和他们的母语是源语言还是目标语无关。

强烈反对	比较反对	中立	比较同意	非常同意

20. 指出以下哪些因素对于译文质量有影响，按照程度对它们进行排序（影响最小为 **1**，最大为 **4**，请勿重复填写数字）。

a. 对于源语文化背景的熟悉度，是否能正确理解分析源文作者的表面和隐含意思；

b. 译者的源语语言水平，包括词汇，搭配，语法结构等知识；

c. 对于目标语文化背景的熟悉度，译文在目标文化中的可读性；

d. 译者的目标语语言水平，包括词汇，搭配，语法结构等知识；				
21. 在翻译过程中，正确理解源文比恰当的生产译文更加重要。				
强烈反对	**比较反对**	**中立**	**比较同意**	**非常同意**
22. 非母语译者只是为了弥补母语译者的短缺而存在，没有其他意义。				
强烈反对	**比较反对**	**中立**	**比较同意**	**非常同意**
23. 对目标语言的熟练掌握可以弥补对源语言知识了解的缺乏。				
强烈反对	**比较反对**	**中立**	**比较同意**	**非常同意**

典故及文化负载词翻译的调查研究

第 1 题 英文文章中的典故和一些文化负载词会让我的阅读过程磕磕绊绊

从未 很少 偶尔 有时 经常

第 2 题 在英文阅读或翻译练习中，我很熟悉其中的英文典故的出处背景和大致意思

强烈反对 比较反对 中立 比较同意 非常同意

第 3 题 作为母语使用者，我在理解中文典故或文化负载词上遇到困难

从未 很少 偶尔 有时 经常

第 4 题 在中文阅读或翻译练习中，我很熟悉其中的中文典故的出处背景和大致意思

强烈反对 比较反对 中立 比较同意 非常同意

第 5 题 我认为典故，成语等文化特殊词汇要比其他通用词汇更难翻译

强烈反对 比较反对 中立 比较同意 非常同意

第 6 题 请选择你熟悉（学习过或在文本中见过）的典故翻译技巧 (Leppihalme, 1997) 并根据熟悉程度排序（例：最熟悉为 1）

a. Using the allusion as such, leave it

b. Using the allusion and adding some guidance

c. Using the allusion, adding a detailed explanation, a footnote

d. Replacing the allusion with another source language one

e. Replacing the allusion with a target language one

f. Omitting the allusion (delete), but transferring the sense by other means

g. Omitting the allusion

第 7 题 在翻译练习或日常工作中，你更倾向或者擅长使用哪种或哪几种翻译技巧，根据程度排序 （例：最常用为 1）

a. Using the allusion as such, leave it

b. Using the allusion and adding some guidance

c. Using the allusion, adding a detailed explanation, a footnote

d. Replacing the allusion with another source language one

e. Replacing the allusion with a target language one

f. Omitting the allusion (delete), but transferring the sense by other means

g. Omitting the allusion

English translation:

Directionality of Translation: Investigating the Student Translators' Perceptions and Performances

1. How long have you been learning English ?				
Less than 5 years	**5-8 years**	**8-10 years**	**10-15 years**	**More than 15 years**
2. How long have you been learning or doing translation?				
Less than 1 year	**1-2 years**	**2-4 years**	**4-6 years**	**More than 6 years**
3. In daily practice, the proportion of Chinese-English (C-E) translation in overall workloads (including courses, assignments etc.) is approximately:				
Less than 25%	**25-50%**	**50%**	**50-75%**	**More than 75%**
4. Any experience in translation practice (working as full-time or part-time translators)?				
None	**Less than 6 months**	**6 months to 1 year**	**1 to 3 years**	**More than 3 years**
5. the proportion of C-E translation during this time?				
0%	**25%**	**50%**	**75%**	**100%**
6. How do you feel about your English proficiency in translation?				
Extremely Unsatisfied	**Hard to accomplish the task**	**Not enough**	**Satisfied**	**Extremely satisfied**
7. How much do you know about English culture and related knowledge?				
Almost none	**Little**	**In specific areas**	**Good**	**Profound**
8. How do you feel about your Chinese proficiency in translation?				
Extremely Unsatisfied	**Hard to accomplish the task**	**Not enough**	**Satisfied**	**Extremely satisfied**
9. How much do you know about Chinese culture and related knowledge?				
Almost none	**Little**	**In specific areas**	**Good**	**Profound**
10. what type of texts in English have you been reading in the past year? Rate them （0 for never, 1 for seldom… 7 for most）				

Novel and stories	Technical/Specialized text
Poetry	Forum/Online posts
Newspaper and magazine	Film, series, songs
Academic texts	Others: _____

11. what type of texts in Chinese have you been reading in the past year? Rate them（0 for never, 1 for seldom… 7 for most）

Novel and stories	Technical/Specialized text
Poetry	Forum/Online posts
Newspaper and magazine	Film, series, songs
Academic texts	Others: _____

12. The proportion of culture translation courses in overall training courses

Less than 25%	25-50%	50%	50-75%	More than 75%

13. The proportion of literature translation courses and works in the overall training courses?

Less than 25%	25-50%	50%	50-75%	More than 75%

14. As a Chinese native speaker, the difficulty of doing C-E translation compared to E-C translation:

C-E more hard	For most work, C-E more hard	No differences	For most work, E-C more hard	E-C more hard

15. When doing the C-E translation, I cannot understand the meaning of the source text, even though it is in Chinese.

Never	Seldom	Sometimes	Often	Always

16. In the English-Chinese (E-C) translation, the TT was unnatural and not authentic, even though it is in my first language.

Never	Seldom	Sometimes	Often	Always

17. I think only English native speakers are qualified to do the C-E translation.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree

18. Compare to E-C translation, Chinese native translator can do better in C-E translation.

Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Reason：

19. I think good translators can do well in both directions, no matter what his/ her first language is.				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
20. Please indicate which factors affect the quality of the translation products most, rate them (put 1 against what you find least influential and go up to 4 for mostly influential, put 0 if you find it is not relevant at all).				
a. The understanding and analysis of the source text; **b. The familiarity of the source culture and background;** **c. The target language proficiency of the translator;** **d. The familiarity of the target culture and background.**				
21. In translation, correctly understanding the source text is more important than appropriately producing the target text.				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
22. Non-native speaker translators compensate for the shortage of native speaker translator.				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
23. Perfect command in the target language can make up for the lack of knowledge in the source language.				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**

The investigation on the translation of allusion

1. I found difficulties understanding English allusion and culture-specific words				
Never	**Seldom**	**Sometimes**	**Often**	**Always**
2. I am familiar with the cultural background and the origin of the English allusions				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
3. I found difficulties understanding Chinese allusion and culture-specific words				
Never	**Seldom**	**Sometimes**	**Often**	**Always**
4. I am familiar with the cultural background and the origin of the Chinese allusions				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
5. Allusions are more difficult to translate than other non-allusion words or phrases				
Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
6. Please indicate strategies you have learnt in the translation training courses, rate them according to the familiarity, 1 as the most familiar				
a. Using the allusion as such, leave it				
b. Using the allusion and adding some guidance				
c. Using the allusion, adding a detailed explanation, a footnote				
d. Replacing the allusion with a target language one				
e. Omitting the allusion (delete), but transferring the sense by other means				
f. Omitting the allusion				
7. Please indicate strategies you adopted in the translation practice, rate them according to the frequencies, 1 as the most frequent				
a. Using the allusion as such, leave it				
b. Using the allusion and adding some guidance				
c. Using the allusion, adding a detailed explanation, a footnote				
d. Replacing the allusion with a target language one				
e. Omitting the allusion (delete), but transferring the sense by other means				
f. Omitting the allusion				

C. Participant information sheets and Consent form

Participant Information Sheet

Study Title: Directionality in translation: an empirical study to the translation process and translation of allusion

Researcher: Haimeng Ren

ERGO number: 47295

You are being invited to take part in the above research study. To help you decide whether you would like to take part or not, it is important that you understand why the research is being done and what it will involve. Please read the information below carefully and ask questions if anything is not clear or you would like more information before you decide to take part in this research. You may like to discuss it with others but it is up to you to decide whether or not to take part. If you are happy to participate you will be asked to sign a consent form.

What is the research about?

The researcher got her bachelor degree in Beijing International Studies University, focusing on the translation of cultural-bound words in the Analects of Confucius. Then she enrolled on the Integrated PhD programme at the University of Southampton in the United Kingdom. This is the PhD project of the researcher, exploring the effect of directionality on the translator's performances in the process of doing literature translation.

Why have I been asked to participate?

Since this study aims to investigate the performances of translators in both translation directions, students majoring in English translation are the focus of this research.

What will happen to me if I take part?

The first phase aims to investigate by means of a questionnaire about the attitude and opinion of participants to the directionality of translation and culture translation in China and how much participants acknowledge those concepts. The questionnaire will be conducted in Chinese and takes about 10 min.

In the second phase, an eye-tracking experiment will be adopted to record the whole process of a 90-min translation test to collect data from the pupil movement of the participants. Participants will be seated in front of a computer or laptop equipped with the Tobii remote eye-tracker monitor to track their pupil movement. At the same time, the performance of the participants producing the target language will be key-logged through Translog, a key-logging software.

In the translation test, participants will be assigned a four-piece test paper to translate: two in Chinese and two in English. Each should be conducted within 20 min. After finishing the translation, there will be a 15min semi-structured interview individually where they will be asked to review their translation process in Chinese on certain aspects of their own performances.

Are there any benefits in my taking part?

There will be cash reimbursements for the time of participants as well as overall feedback or suggestions on the participants' performances if required. The

participants will hopefully improve their knowledge in translation theory and practical strategies in certain aspects of translation.

Are there any risks involved?

There would be no serious hazards in this experiment. The only thing to bear in mind is that the translation process would be more than 1 hour and may cause slight tiredness on your eyes. Between every two pieces of translation, you may take a 10min break if needed

What data will be collected?

Participants will be asked to complete a pre-test questionnaire, concerning their experience in translation studies and practices and their perceptions and attitude towards the issue of directionality and cultural reference translation. The system of eye-tracking will generate numerical data on the pupil activities, like gaze time, fixation duration, fixation count for the researcher. It will generate a video, recording the operation of participants on screen, including all the typing, searching, moving, and most importantly, the pupil moving trace to further support the collected eye-tracking data. The key-logging software will record all the activities on keyboard in the process of producing the target language. The video of their translation activity on the screen will be adopted as a tool to raise their memories in the following interview section to review their own translation performances. During the interview, the audio recorder will collect the participant reflection on their own performances.

Will my participation be confidential?

Participants personal information will be coded randomly so that they are not identified by the researcher in the following data analysis procedure. All the questionnaires will be locked in secure place, including consent forms. All the data from the translation test, as well as the interview recording, will be password-protected in both the researcher's computer and hard-disk and will also be uploaded to the secure research data storage provides by the University of Southampton, with only the researcher will have the access to those data.

Do I have to take part?

No, it is entirely up to you to decide whether or not to take part. If you decide you want to take part, you will need to sign a consent form to show you have agreed to take part.

If you are interest in participating in this experiment, please leave your contact details on the questionnaire form or directly contact the researcher by phone or email.

What happens if I change my mind?

You have the right to change your mind and withdraw at any time without giving a reason and without your participant rights being affected.

If you have changed your mind, feel free to contact the researcher through email: hr1n16@soton.ac.uk

What will happen to the results of the research?

Your personal details will remain strictly confidential. Research findings made available in any reports or publications will not include information that can directly identify you without your specific consent. The researcher will be willing to send a copy of the results to the participants if necessary.

Where can I get more information?

For more information and query, please email:hr1n16@soton.ac.uk

What happens if there is a problem?

If you have a concern about any aspect of this study, you should speak to the researcher who will do their best to answer your questions.

Contact detail: Haimeng Ren, hr1n16@soton.ac.uk

If you remain unhappy or have a complaint about any aspect of this study, please contact the University of Southampton Research Integrity and Governance Manager (023 8059 5058, rgoinfo@soton.ac.uk).

Data Protection Privacy Notice

The University of Southampton conducts research to the highest standards of research integrity. As a publicly-funded organisation, the University has to ensure that it is in the public interest when we use personally-identifiable information about people who have agreed to take part in research. This means that when you agree to take part in a research study, we will use information about you in the ways needed, and for the purposes specified, to conduct and complete the research project. Under data protection law, 'Personal data' means any information that relates to and is capable of identifying a living individual. The University's data protection policy governing the use of personal data by the University can be found on its website (https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page).

This Participant Information Sheet tells you what data will be collected for this project and whether this includes any personal data. Please ask the research team if you have any questions or are unclear what data is being collected about you.

Our privacy notice for research participants provides more information on how the University of Southampton collects and uses your personal data when you take part in one of our research projects and can be found at http://www.southampton.ac.uk/assets/sharepoint/intranet/ls/Public/Research%20and%20Integrity%20Privacy%20Notice/Privacy%20Notice%20for%20Research%20Participants.pdf

Any personal data we collect in this study will be used only for the purposes of carrying out our research and will be handled according to the University's policies in line with data protection law. If any personal data is used from which you can be identified directly, it will not be disclosed to anyone else without your consent unless the University of Southampton is required by law to disclose it.

Data protection law requires us to have a valid legal reason ('lawful basis') to process and use your Personal data. The lawful basis for processing personal information in this research study is for the performance of a task carried out in the public interest. Personal data collected for research will not be used for any other purpose.

For the purposes of data protection law, the University of Southampton is the 'Data Controller' for this study, which means that we are responsible for looking after your

information and using it properly. The University of Southampton will keep identifiable information about you for 10 after the study has finished after which time any link between you and your information will be removed.

To safeguard your rights, we will use the minimum personal data necessary to achieve our research study objectives. Your data protection rights – such as to access, change, or transfer such information - may be limited, however, in order for the research output to be reliable and accurate. The University will not do anything with your personal data that you would not reasonably expect.

If you have any questions about how your personal data is used, or wish to exercise any of your rights, please consult the University's data protection webpage (https://www.southampton.ac.uk/legalservices/what-we-do/data-protection-and-foi.page) where you can make a request using our online form. If you need further assistance, please contact the University's Data Protection Officer (data.protection@soton.ac.uk).

All the data is anonymised data.

Thank you.

Haimeng Ren

PhD Candidate

University of Southampton

Hr1n16@soton.ac.uk

CONSENT FORM

Study title: Directionality in translation: an empirical study to the translation process and translation of allusion

Researcher name: Haimeng Ren

ERGO number: 47295

Please initial the box(es) if you agree with the statement(s):

I have read and understood the information sheet [47295 Version 2] and have had the opportunity to ask questions about the study.	
I agree to take part in this research project and agree for my data to be used for the purpose of this study.	

I understand my participation is voluntary and I may withdraw for any reason without my participation rights being affected.	
I understand that I will not be directly identified in any reports of the research.	
I understand that taking part in the study involves audio recording which will be transcribed and then destroyed for the purposes set out in the participation information sheet.	

Name of participant (print name)……

Signature of participant…….

Date……..
……..

Name of researcher (print name)……**HAIMENG REN**……

Signature of researcher ……  …….

Date……**4th March 2019**……..

D. Eye-data quality and Typing speed

Gaze sample for eye data quality

Participants ID	Rec	Gaze sample	Participants ID	Rec	Gaze sample	Participants ID	Rec	Gaze sample
P01	Rec 00	74	P16	Rec 22	93	P31	Rec 43	93
	Rec 01	71		Rec 23	58	P32	Rec 45	91
P02	Rec 02	83	P17	Rec 24	61		Rec 46	93
P03	Rec 04	76		Rec 25	67		Rec 47	92
P05	Rec 05	69	P18	Rec 26	78	P33	Rec 48	85
	Rec 06	60	P19	Rec 27	65		Rec 49	81
P08	Rec 07	41		Rec 28	64	P34	Rec 51	80
	Rec 08	40	P20	Rec 29	89		Rec 52	89
	Rec 09	41		Rec 30	84		Rec 53	67
	Rec 10	40	P21	Rec 31	90		Rec 54	71
P09	Rec 11	82	P22	Rec 32	91	P35	Rec 55	84
	Rec 12	77	P23	Rec 33	91	P36	Rec 56	89
P10	Rec 13	51	P24	Rec 34	89	P37	Rec 57	86
P11	Rec 14	91	P25	Rec 35	62		Rec 58	87
	Rec 15	86		Rec 36	60		Rec 59	77
P12	Rec 16	86		Rec 37	58		Rec 60	83
P13	Rec 17	89	P26	Rec 38	83		Rec 61	80
P14	Rec 18	86	P27	Rec 39	76		Rec 62	75
P15	Rec 19	86	P28	Rec 40	74			
	Rec 20	84	P29	Rec 41	77			
	Rec 21	84	P30	Rec 42	61			

Mean fixation duration for eye data quality

Participants ID	MFD	Participants ID	MFD	Participants ID		MFD
P00	0.24	P15	0.2	P27		0.15
P02	0.28	P16	0.19	P28		0.2
P03	0.2	P17	0.2	P29		0.28
P05	0.28	P18	0.14	P30		0.11
P06	0.21	P19	0.3	P31		0.29
P08		P20	0.2	P32		0.27
P09	0.18	P21	0.29	P33		0.19
P10	0.17	P22	0.27	P34		0.23
P11	0.15	P23	0.24	P35		0.17
P12	0.17	P24	0.2	P36		0.23
P13	0.24	P25	0.13	P37		0.23
P14	0.18	P26	0.21			

Percentage of gaze time on the screen for eye data quality

Participant ID	GTS	Participant ID	GTS	Participant ID	GTS
P00	0.78	P15	0.64	P27	0.53
P02	0.73	P16	0.42	P28	0.56

P03	0.60	P17	0.58	P29	0.67
P05	0.59	P18	0.62	P30	0.46
P06	0.59	P19	0.70	P31	0.58
P08		P20	0.59	P32	0.61
P09	0.44	P21	0.75	P33	0.68
P10	0.53	P22	0.54	P34	0.61
P11	0.56	P23	0.56	P35	0.61
P12	0.66	P24	0.58	P36	0.54
P13	0.63	P25	0.56	P37	0.60
P14	0.57	P26	0.69		

Gaze sample to fixation percentage for eye data quality

Participant ID	GFP	Participant ID	GFP	Participant ID	GFP
P00	0.92	P15	0.91	P27	0.96
P02	0.92	P16	0.73	P28	0.90
P03	0.84	P17	0.88	P29	0.93
P05	0.91	P18	0.95	P30	0.70
P06	0.90	P19	0.94	P31	0.98
P08		P20	0.93	P32	0.95
P09	0.95	P21	0.93	P33	0.91
P10	0.83	P22	0.95	P34	0.93
P11	0.93	P23	0.94	P35	0.90
P12	0.91	P24	0.94	P36	0.95
P13	0.93	P25	0.92	P37	0.96
P14	0.95	P26	0.88		

Typing speed

Participant	Mean EN	Mean CH	Mean speed	Participant	Mean EN	Mean CH	Mean speed
P01	189.77	216.08	202.925	P20	396.57	464.63	430.6
P02	284.11	261.25	272.68	P21	240.14	234.05	237.095
P03	307.09	251.28	279.185	P22	380.01	279.29	329.65
P05	472.67	309.24	390.955	P23	442.55	386.27	414.41
P06	463.27	410	436.635	P24	401.59	319.52	360.555
P08	299.19	225.6	262.395	P25	313.92	267.02	290.47
P09	457.64	324.5	391.07	P26	257.35	151.6	204.475
P10	254.21	223.03	238.62	P27	326.91	299.49	313.2
P11	471.71	421.85	446.78	P28	407.59	381.95	394.77
P12	292.82	292.08	292.45	P29	319.05	268.27	293.66
P13	410.54	363.97	387.255	P30	356.37	347.72	352.045
P14	484.75	340.65	412.7	P31	378.35	360.79	369.57
P15	226.52	175.22	200.87	P32	434.91	294.25	364.58
P16	403.13	321.17	362.15	P33	225.61	190.59	208.1
P17	378.98	329.39	354.185	P34	411.62	373.57	392.595
P18	330.01	339.04	334.525	P35	341.01	274.2	307.605

P19	270.4	292.39	281.395	P36	486.36	296.39	391.375

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