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A Corpus-based Study of the Impact of Directionality on English<>Chinese Simultaneous Interpreting

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Abstract

This PhD thesis investigates the impact of directionality on English<>Chinese simultaneous interpreting (SI) based on a purposely built spoken corpus. The study examines disfluencies (filled pauses and repetitions) and repairs from both quantitative and qualitative perspectives. An expert-novice paradigm is also adopted with the aim of determining if directionality influences these two different groups. The quantitative analyses look at the frequency of filled pauses and repetitions, as well as the frequency of different types of repairs (including appropriateness repairs, different repairs, error repairs, mid-articulatory repairs and repair failures) and the proportion of each category of disfluencies and repairs. The aims are to determine if directionality influences SI fluency and to provide a holistic view of the extent to which directionality influences the occurrence of disfluencies and repair behaviour. These quantitative analyses are complemented by qualitative analyses of filled pauses and repetitions, as well as each category of repairs. The aims are to examine the influence of directionality on the occurrence of filled pauses and repetitions and to examine the reasons that cause these repairs. The results indicate that directionality has some impact on the interpreting performance of student interpreters, but such impact is negligible on the performance of professionals. The results also show that expertise helps professional interpreters cope with the challenge caused by directionality better in comparison with student interpreters, even with an average of 3.5 years' experience. Findings in this study provide new insights on the understanding of disfluencies and repairs through interpreters' performance. In addition, the study contributes to closing the current gaps in the literature regarding the impact of directionality on disfluencies and repairs in English<>Chinese SI and presents pedagogical implications for SI training in these two directions.

Declaration

This work has not previously been accepted in substance for any degree and is not being concurrently submitted in candidature for any degree.

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Date .....

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This thesis is the result of my own investigations, except where otherwise stated. Other sources are acknowledged by footnotes giving explicit references. A bibliography is appended.

Signed ..... (candidate)

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Date .....

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List of Abbreviations

Abbreviation	Explanation
BT	back translation
C	Chinese
CI	consecutive interpreting
E	English
EVS	ear-voice-span
p (lower case)	P value
P (upper case)	professional interpreters
S	student interpreters
SI	simultaneous interpreting
SL	source language
ST	source text
t	T value
TL	target language
TT	target text

Introduction

As one of the interpreting modes in conference interpreting, simultaneous interpreting (SI) is a highly cognitive act of communication where the interpreter needs to listen to the message in the source language, comprehend the message, convey the message in the target language, and monitor the output, all at the same time. The topic of directionality has long been a contentious issue in interpreting studies (e.g., Déjean Le Féal, 2005; Denissenko, 1989; Donovan, 2005; Seleskovitch, 1968). The debate on directionality in conference interpreting can be traced back to the different standpoints held by the "Paris School" which asserts that interpreting from B to A is of higher quality, and the "Soviet School" which argues that interpreting in either direction is acceptable (Pöchhacker, 2016).

Although a number of studies have addressed this issue from perspectives such as the preference of interpreting direction, interpreting teaching, and cognitive implications, understanding of this topic is still limited. Most research is restricted to B-to-A interpreting. Quality-oriented studies in the field of directionality have not focused attention on paralinguistic features in simultaneous interpreting, especially in the language combination of English and Chinese. Therefore, this thesis aims to fill this gap by investigating the impact of directionality (A-to-B and B-to-A) on English-Chinese SI from the perspective of disfluencies (filled pauses and repetitions) and repairs.

Under the available theoretical frameworks of the Effort Models (Gile, 2009) and repair mechanisms (Levelt, 1983), the overarching question proposed in this research is whether directionality influences the SI performance of two groups: student and professional interpreters. The three specific research questions that this study seeks to address are as follows:

(1) To what extent and in what ways does directionality impact the disfluency frequency in SI?

(2) To what extent and in what ways does directionality impact the repair frequency in SI?

(3) To what extent does performance differ across the two groups of interpreters under the impact of directionality?

In order to answer these questions, the study recruited ten student interpreters and ten professional interpreters, each working in two directions, namely from English (B language) to Mandarin Chinese (A language), and vice versa. The participants in this study are all native Chinese speakers. Ten students are from three UK universities that offer an MA in English-Chinese translation and interpreting and who had received at least one semester of SI training before they took part in this study. All ten professional interpreters have obtained a master's degree in Translation and Interpreting from a UK university and had an average of 3.5 years' working experience in this field. The materials used consist of one English and one Chinese speech, each delivered by a native speaker at a UN high-level meeting. Each speech lasts about 15 mins. Accordingly, a spoken corpus was built, which consists of two sub-corpora: one is the English original speech with Chinese interpretation versions produced by ten student interpreters and ten professional interpreters, the other one is the Chinese original speech with English interpretation versions produced by the same group of participants. All the recordings were transcribed by speech recognition software and then manually checked. All the disfluencies and repairs were specifically manually annotated for analysis. The data analysed comprises not only the spoken and text corpora, but also questionnaires as well as retrospective interviews, prompted by looking at the source texts and listening to the interpretations directly after each interpretation task. For the quantitative analysis of disfluency and repair frequency, inferential statistics were used. Depending on the results of data normality tests, either a paired-samples t-test or the Wilcoxon signed-rank test was used to investigate the impact of directionality on participants' performance within each group. For inter-group comparison with regard to the impact of expertise on interpreting performance in each direction, an independent t-test or the Mann-Whitney U test was adopted. In addition, a qualitative analysis which focuses on the triggers that cause disfluencies and repairs among participants was used, in combination with the retrospective interviews.

The thesis consists of seven chapters. Chapter 1 provides a holistic literature review in terms of general background of SI and its cognitive processes by pointing out some of the factors that influence interpreters' performance. Chapter 2 focuses on a discussion of directionality and SI. It starts from the notion of directionality, followed by a review of available research in translation studies and other translational activities related to directionality before moving on to a full discussion of directionality and

interpreting research. Chapter 3 explains the methodology adopted in this study. The current study adopts both quantitative and qualitative methods as well as building an interpreting corpus with the aim of addressing the proposed research questions. Further information on how this study is designed and how the interpreting corpus is analysed is also discussed in this chapter. On top of this, the analysis of questionnaires (Appendix I and II) is presented in this chapter. Chapters 4 and 5 present the following results: (1) quantitative analysis of disfluency frequency; (2) quantitative and qualitative analysis of filled pauses, repetitions and repairs. Chapter 6 provides a discussion based on the results presented in the previous chapters. It particularly focuses on how directionality influences the occurrence of disfluency and the behaviour of repairs in the context of both student interpreters and professional interpreters. Chapter 7 provides a summary, followed by implications of the study and limitations and potential future research.

Chapter 1 Simultaneous Interpreting and its Cognitive Processes

This chapter starts with a literature review of SI from the perspectives of analysing the differences between translation and interpreting activities and the cognitive processes involved, including comprehension, simultaneity, input and non-input variables, working memory and production-related strategies.

1.1 General background of simultaneous interpreting

This section provides a general overview of translational activities in translation and interpreting Studies. First, Section 1.1.1 differentiates translation activities from interpreting activities from an academic perspective through relevant definitions and features. The next section presents two specific modes of interpreting, namely consecutive and simultaneous interpreting, as well as further explaining the distinctive features of SI.

1.1.1 Differences between translation and interpreting

In everyday life, people seem to have the mindset that translation and interpreting are the same thing, although interpreting is regarded as a translational activity (Pöchhacker, 2016, p. 9), and interpreters are sometimes referred to as translators (ibid). In the academic field, some attempts have been made to define translation and interpreting, respectively. For example, Munday (2008, p. 5) points out that the term *translation* in translation studies mainly refers to written translation instead of oral translation (known as interpreting), and the process of translating two written languages "involves the translator changing an original written text (or ST) in the original verbal language (the source language or SL) into a written text (target text or TT) in a different verbal language (the target language or TL), while interpreting is defined as "a form of translation in which a first and final rendition in another language is produced on the basis of a one-time presentation of an utterance in a source language" (Pöchhacker, 2016, p. 11).

As Gile (2004, p. 12) points out, translation and interpreting share some similarities in:

> (1) reformulating a source text (written, spoken or signed) into a target text (also written, spoken or signed);
> (2) dealing with inter-linguistic problems raised by linguistic issues, such as lexical and grammatical discrepancies which force them to decide what information to keep, what information to discard and what information to add;
> (3) dealing with intercultural issues;
> (4) dealing with a lack of relevant thematic and [language for specific purposes] (LSP)-specific knowledge, which force them to look for additional information.

When talking about the difference between translation and interpreting, most people would have a general idea that "translation is concerned with written texts and interpreting with oral speech" (Schäffner, 2004, p. 1).

A very distinctive feature that differentiates interpreting from translation, based on the definitions mentioned above, is that interpreting is an immediate activity (Pöchhacker, 2016, p. 11). Differences in the aspects of working and process environment, product, skills and interpreters' personality between translation and interpreting activities imply that their implications are not the same. Compared with translators, interpreters need to (1) instantly respond to the oral form of passive language(s) in order to process acoustic signals with a wide variety of voices, accents and prosodic features; (2) acquire additional specific knowledge before carrying out interpreting tasks; (3) make decisions in a short time and adopt appropriate interpreting strategies; and (4) adhere to form and content instead of focusing on stylistic features in written translation (Gile, 2009b, p. 53; Pöchhacker, 2016). It is also worth mentioning that interpreters have very little chance to refine their final output, therefore they are under the pressure of time limits and processing capacity and need to endure more stress (ibid).

1.1.2 Differences between CI and SI

Conference Interpreting, especially consecutive interpreting (CI), did not appear until World War I when interpreters provided interpreting services for American and British negotiators who did not speak French (Gile, 2009b, p. 51). It is widely used nowadays in various occasions, such as "high-level meetings in multinational corporations, important political and business visits and negotiations, and even in high-level court proceedings" (Gile, 2009b, pp. 51-52). The working mode of Conference Interpreting is divided into CI and SI. CI is defined as "the interpreter listens to a speech segment of a few minutes or so, takes notes, and then delivers the whole segment in the target language; then the speaker resumes for a few minutes, the interpreter delivers the next segment, and the process continues until the end of the speech" (Gile, 2004, pp. 11-12, 2009b, pp. 51-52; Pöchhacker, 2016, p. 18). SI is categorised by Herbert, working as a simultaneous interpreter and interpreter trainer, into three varieties: whispering, telephonic simultaneous and translation at sight (Seeber, 2015, p. 80). Pöchhacker (2016, p. 20) further expands on the forms of SI, as shown in Figure 1-1:

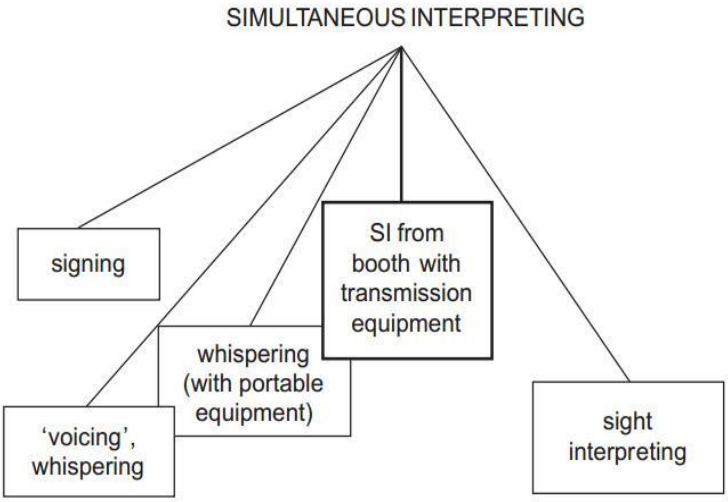

Figure 1-1 Forms of SI

In this study, SI specifically refers to when "the interpreter sits in an interpreting booth, listens to the speaker through a headset and interprets into a microphone at the same time. Delegates in the conference room listen to the target-language version through a headset." (Gile, 2004, p. 11, 2009b, p. 52; Russell, 2005, p. 136)

Concerning SI as a specific mode of interpreting, it does not only entail all the basic differences between translation and interpreting, but also shows some other discrepancies compared with translation activity due to its specific nature. For instance, in terms of comprehension and memory processes, although it is significant for both translators and simultaneous interpreters to understand the meaning of the original information at different levels, simultaneous interpreters need to complete the comprehension and memory processes while listening and speaking. This means factors such as the processing unit, the structure of expectations, or the mental model and the processes of attention and memory could contribute to qualitative changes in the way of comprehension and memory processes between translation and SI (Bajo et al., 2001).

When it comes to differences between CI and SI, a limited number of studies from different perspectives have been conducted (e.g., Dam, 1998; Gerver, 1976). For example, Gerver (1976, p. 178) points out that SI is less accurate compared with CI, but simultaneous interpreters will bear greater pressure because they need to listen, speak and comprehend at the same time. Dam (1998, p. 52) elaborates on the difference of the production of TT utterances, explaining that the TT utterances of SI

are “produced immediately upon reception of the corresponding source text utterances”, while those of CI are with “a time lag of up to several minutes”.

Through a brief comparison between SI and other translational activities such as translation and CI respectively, it could be concluded that SI manifests many cognitive challenges, which are not represented in other forms as mentioned above. Therefore, this study will particularly focus on the cognitive processes of SI and elaborate this highly complex activity through empirical research.

1.2 Cognitive processes of SI

Cognitive process is one of the topics that is frequently discussed by scholars when examining the SI processes. Through interdisciplinary research methods such as the advanced fMRI technology used by neuroscientists, the detailed interpreting cognitive process of a simultaneous interpreter can be further analysed and measured. This section reviews previous studies that explore comprehension, simultaneity, production, input variables, working memory and SI strategies, and discusses the complex cognitive process in SI.

1.2.1 Comprehension

As mentioned in Section 1.1.1, translation and interpreting show far more differences than similarities. In terms of SI, interpreters experience temporal pressure by understanding the discourse simultaneously, so this would lead to a completely different comprehension process in SI in comparison with translation. It is pointed out that an interpreter probably devotes “80% of their effort or cognitive ability to listening and comprehension and only 20% to speech production” (Bajo et al., 2001, p. 28). During the comprehension process, interpreters are required to manage and split their attention and use their short-term memory as a trigger. Therefore, comprehension is a significant component in the interpreting process, because it is a prerequisite to making sure that messages delivered by speakers can be understood by interpreters. In other words, one must first understand before providing interpretation.

The accepted comprehension models in translation studies divide the comprehension process into two categories: 1) micro operations, which entail low-level operations by recognising and decoding linguistic information; 2) macro operations, which include high-level strategies to link prior knowledge and details of the communicative situation with textual information (Ericsson & Kintsch, 1995; Van Dijk & Kintsch, 1983). Similarly, Pöchhacker (2016, p. 114) refers to the behaviour

of comprehension, which can be considered from two perspectives: the understanding of spoken language and knowledge-based processing.

The studies conducted in the field of understanding of spoken language are very limited compared with knowledge-based processing research, which will be discussed in the following paragraph. The reason might be that interpreting researchers have little interest in lower-level stages of language understanding, such as "phoneme identification, word recognition, lexical disambiguation and sentence parsing" (ibid). Despite this, a study by Bajo, Padilla and Padilla (2000) on the comprehension process in SI was carried out by comparing four groups, including ten practitioners, either passing the final interpretation exam at university level or interpreters with about five years' working experience; eight bilinguals (with English, Spanish, German or Arabic as A and B language); ten students from the second year of the BA interpreting programme and ten professionals from other fields. Part of the research involves exploring interpreters' possible superiority in the processes of lexical access and semantic access. Therefore, four groups of participants (interpreters, bilinguals, interpreting students and non-interpreters) in this study were asked to take part in the task of lexical decision and categorisation. When testing the lexical decision, participants needed to react as quickly as possible to identify either a word or non-word when a word or a group of pronounceable letters (a non-word) were displayed on the computer screen (Bajo et al., 2000, pp. 132-133). In terms of categorisation, the participants needed to decide on the match between the concept denoted by the word and a member of the category based on the given word and the name of a category (ibid). The result of the lexical decision showed that among four groups of participants, interpreters' performance surpassed the other three groups in response time for identifying both word and non-word. For all the four groups, the response time of non-word was much longer than that of word. For the result of the categorisation task, the group of interpreters continued to perform well. It showed that interpreters responded much faster than the other three groups in both typical and non-typical exemplars and this manifests that interpreters are able to access semantic information more quickly, especially in difficult relations (Bajo et al., 2000, p. 134). In addition, the study also analysed the relation between comprehension and working memory, reaching a conclusion that not only the greater speed in semantic access, but also a strong capacity of short-term memory, as well as its efficient use, contribute to interpreters' superior

comprehension (Bajo et al., 2000, p. 140). In summary, this study demonstrated that interpreters read fast and accurately, and they possess a faster access to lexical and semantic information, larger working memory capacity and an efficient use of capacity (ibid). It is suggested that the training of future interpreters should focus on extending memory capacity, because this will greatly enhance the process of comprehension.

As mentioned earlier, the other aspect of comprehension is knowledge-based processing. Unlike the comprehension of spoken language where interpreters receive the verbal information passively, knowledge-based understanding is an active way to process information based on previously accumulated knowledge, no matter if it is "lexical, syntactic, pragmatic, encyclopedic, etc." (Pöchhacker, 2016, p. 115). That is why it is a common practice for both professional and student interpreters to familiarise themselves with the general topic, background information and specific terminology by making a glossary when they make preparations for SI. Some empirical studies have proved the key role of prior knowledge in facilitating comprehension in the interpreting process. For instance, eight professional conference interpreters and eight bilingual graduate students were invited in Dillinger's study (1994) to simultaneously interpret two 580-word texts from English into French. The findings suggested that factors that have an impact on interpreters' performance and text comprehension are the same, namely, text structure and prior knowledge. If the interpreter shares the same knowledge as presupposed by the speaker, or the text designed by the speaker or writer can be well-understood by the interpreter, then the gap between the interpreter, as a receiver of the knowledge, and the speaker, as the sender of the knowledge, can be narrowed. The comprehension of the ST would be effort-saving and the efficiency of communication will be improved. Similarly, a recent study carried out by Díaz-Galaz, Padilla and Bajo (2015) found that any advance preparation, including getting access to reliable and relevant information such as slides, speech scripts and glossary, is beneficial to both experienced and inexperienced interpreters with a result of shorter Ear-Voice Span (EVS) and greater accuracy, and it will also facilitate the balancing between comprehension and production.

1.2.2 Simultaneity

Simultaneity has drawn much attention in process-oriented research, as it is one of the most salient features of SI. According to Gerver (1971, pp. 47-48), simultaneity refers to "the number of words the interpreter is prepared to lag behind the original". This

section specifically discusses the use of silent pauses to cope with simultaneity (Section 1.2.2.1), simultaneity and self-monitoring (Section 1.2.2.2) and simultaneity under the condition of the use of script or text in SI (Section 1.2.2.3).

1.2.2.1 Listening, speaking and pauses

A great number of objective studies (e.g., Barik, 1973, 1975; Gerver, 1974; Goldman-Eisler, 1972) of simultaneity have been carried out, adopting different methods and using various equipment. A series of studies produced a very similar result, that there is an overlap between speakers' speech and interpreters' interpretation in terms of concurrent listening and speaking time. Chernov (1994, p. 139) found that interpreters spent approximately 70% of the time speaking and listening simultaneously and the source language speaker devoted 100% of the total speaking time. In Gerver's (1971, pp. 75-76) study, the time allocated to speaking and listening was over 75% for some interpreters, and the accuracy rate could maintain over 85%. Therefore, the concurrent listening and speaking in the SI process clearly demonstrates the attention-sharing capacity of interpreters.

However, the challenges of concurrent listening and speaking cannot be overlooked, as this might still be the source of conflict or interference in SI. Jaffe, Feldstein and Cassota (1967) point out that although subjects seem to be able to listen to two voices concurrently, the task of speaking and listening simultaneously is difficult if one of the two voices is the interpreter's own voice. Crowder (1970) holds a similar opinion that receiving the interpreter's own auditory input may bring some advantages, but interpreters may need to face special demands which are not present during passive or covert (hidden) vocalization. Due to the reason of allocating attention to listening and speaking and its pressure on interpreters' brain capacity, this might partly explain why interpreters need to shift after 15 to 20 minutes in the booth (Christoffels & De Groot, 2004, p. 227).

The way of coping with challenges of simultaneity is through sufficient practice. Lambert (2004, p. 296) indicates that a highly learned skill will let subjects devote less deliberate attention or little allocation of mental effort, which means this has become an automated or intrinsic aptitude that interpreters hold. Apart from this, another available method is the use of silent pauses. Pauses, as defined by Goldman-Eisler (1968, p. 128), mean "the intermittent silence between chunks of speech in the speaker's utterance". It is suggested by both interpreters and psycholinguists that

interpreters may use the "intermittent silence" to avoid the simultaneity of listening and speaking (Pöchhacker, 2016, p. 120), as interpreters can use pauses in the source speech to produce as much as possible of their own output, without interference from their own output (Goldman-Eisler, 1968, p. 128). The notion of pauses proposed by Goldman-Eisler (1968) is further testified by Barik (1973). He found that interpreters make greater use of SL pauses which occur between units of meaning. Accordingly, interpreters are more likely to start their own input during such a pause in the source language speech in order to interpret units of meaning instead of words. Therefore, a good use of pauses can largely reduce the stress caused by listening and speaking simultaneously.

However, Gerver (1975, p. 123) argues that "there are very few pauses the interpreters could have taken advantage of in the way suggested" based on the pause-time analyses of speeches at real conferences. According to the data collected by Gerver, about 83% of 804 pauses lasted for one second or less, while only 17% of pauses were longer than one second, on the basis of employing a pause criterion of 250 msec. Hence, he thinks it is doubtful whether simultaneity poses a great challenge to experienced interpreters, but some other difficulties may have a great impact on the performance of experienced interpreters - for instance, a speaker's accent or delivery style (e.g., impromptu), the visibility of the speaker by interpreters in the booth, and availability of a script. Nevertheless, it is possible that inexperienced interpreters, such as students, at the beginning of their learning, may not cope with simultaneity very well and are very likely to use pauses as a buffer to deal with more information.

1.2.2.2 Listening, speaking and self-monitoring

In fact, the process of concurrent listening and speaking only reflects part of the simultaneity features in SI. Interpreters, in most cases, need to monitor their simultaneous output at the same time in order to guarantee the quality of interpretation. This process once again demonstrates that SI is a demanding, challenging and complex activity. This section explains how self-monitoring works in the SI process and its importance for ensuring interpreting quality.

Output monitoring is a procedure controlled by interpreters. Theoretically, this step is illustrated clearly in the processing procedures of Gerver's (1976) and Moser's (1978) models. Both Gerver and Moser point out that the behaviour of checking the interpretation of the source message exists before the interpreter articulates the

utterances. Even if output is produced without checking, interpreters will either proceed or halt based on their satisfaction of the output as well as their operational memory. As in Gile's (1999) well-known Effort Model, he summarises that the efforts needed for SI include the Listening and Analysis (L) Effort, the Production (P) Effort, the Short-term memory (M) Effort and the Coordination (C) Effort, among which the monitoring function seems to be included in the Production Effort, instead of being listed as a separate part of the model. A further explanation of this Model will be presented in Section 2.4.3.1.

It is interesting to note that several corpus-based studies have been carried out on self-monitoring. Among these studies, repairs or self-modification received great attention. This might be because the product of SI can better represent the process of translation and the transcribed corpus may serve as valuable material for examining the monitoring process against empirical data (Tirkkonen-Condit, 2005, p. 411). For example, Petite (2005) investigated the occurrence of repairs in SI by compiling a trilingual corpus (English/French/German) made up of recordings of four different international conferences. In the experiment, eight professional interpreters worked from their B language (English) into their A language (German/French), among which two people worked from English into German and the rest worked from English into French. Based on the framework of Levelt's taxonomy of repairs, Petite (2005, pp. 34-44) finally classifies four categories of repairs in SI, including post-articulatory appropriateness repairs[1], post-articulatory error repairs, post-articulatory D (different)[2] repairs and mid-articulatory repairs, reaching a conclusion that the trigger of the repairs is twofold: (1) input-generated repairs due to the repaired utterance of the original speakers are produced "in order to achieve greater resemblance with the original input"; (2) output-generated repairs triggered by the interpreters are "aimed at achieving greater relevance by maximising the effect of his/her output and minimising the effort in producing and receiving it". Petite also thinks that it would be oversimplistic to argue that interpreters only repair errors if the complexity of the repairing process is taken into consideration. Phenomena such as repairing the

[1] According to Petite (2005: 30), A has further subdivisions into AA (where the speaker repairs an ambiguous term), AL (where the speaker moves from a less to a more precise term), AC (where the speaker monitors for coherence with previous text or terminology) and ALC (where it was not possible to determine whether the speaker is making a level adaption (in other words, changes the terminology) or establishing coherence).

[2] According to Petite (2005:30), D refers to different order of words.

appropriateness of the utterances, changing word order for the completeness of the utterances, or stopping in mid-flow and changing the utterance to finish the sentence should all be counted as part of the repair mechanisms. Similarly, Rouhe (2017) also focused on repair by researching the impact of structural differences of grammar on fluency of SI in a Finnish into Russian corpus. Among her findings, she noticed that there is a significant causal connection, both quantitively and qualitatively, between Finnish compounds and repetitions and self-repairs and abstract words, including nouns (e.g., ulkoistaminen 'outsourcing'), adjectives (e.g., selkeä 'exact') and verbs, which caused almost 50% of all self-repairs and one third of all repetitions.

Apart from the research on the occurrence of repair, Petite (2008) took a further step and proposed the argument that the experience of interpreters might have an effect on the awareness of the monitoring function during SI. Therefore, by building up a trilingual corpus, Petite (2008) conducted a study of monitoring in SI to compare the performance of trainee interpreters and professionals. However, due to the limited quantitative analysis and the paucity of subjects, only some hypotheses were proven in this study. Nevertheless, it was shown by the data that trainee interpreters have some awareness of detecting trouble while interpreting and generally show more repairing than their professional counterparts. Output-generated repairs are more frequent than input-generated ones. Moreover, more repairs in the aspects of A (appropriateness), E (error) and D (different) are produced by trainees than by professionals.

In fact, the reason why trainee interpreters would have more repairs than professionals might also be related to their comprehension capacity. The study of Yudes, Macizo, Morales and Bajo (2013) regarding comprehension and error monitoring in SI demonstrated that interpreters identified more syntactic and semantic errors than monolinguals, bilinguals and interpreting students when all groups were required to read the given English texts while monitoring and pointing out possible errors. With the accumulation of experience, professional interpreters will "develop more efficient comprehension strategies" to swiftly cope with "semantic and syntactic incoherencies or ambiguities" under time pressure while "trying to re-express the source message in the target language" (Yudes et al., 2013, pp. 1050-1051). However, even though professionals are adept at recognising errors, it is interesting to notice that if professional interpreters were asked to consciously focus only on one aspect, either input or output in SI, and reverted back to behaviour that was expected from beginners,

the quality of interpretation deteriorated significantly, regardless of experience and any other factors (Lambert, 2004, p. 297).

In these studies, although a number of them have centred on repairs, very few studies focus on how directionality influences the repair mechanism in SI. This is a gap that the current study attempts to fill. It would also be interesting to know how interpreters shift between listening, speaking and self-monitoring, and how much effort is spared or coordinated in different tasks. However, given the focus of the current study on the impact of directionality, this gap will not be discussed in detail.

1.2.2.3 Listening, speaking and sight interpretation

Nowadays, on occasions such as high-level meetings, interpreters might also be given the written scripts that speakers will use at short notice so that interpreters are able to listen, speak and monitor while reading the written version of speech for clues. Unlike sight translation, which solely "involves the transposition of a message written in one language into a message delivered orally in another language", sight interpretation, also known as simultaneous interpretation with text, needs interpreters to follow the message both aurally and visually, as interpreters are required not only to follow the text that is being read, but also listen to the speaker, as s/he may depart from the original text occasionally (Lambert, 2004, pp. 298-299). Therefore, one of the obvious constraints of sight interpretation is dual input, namely in aural and visual ways concurrently.

Though studies of sight interpretation in terms of shared attention in listening, speaking and reading script are very few, some of the findings are still worth discussing. Cammoun-Claveria, Davies, Ivanov and Naimushin (2009) conducted a study from the perspective of advantages and disadvantages of SI with text, and found out through a questionnaire that both interpreting students and experienced interpreters claimed that it is very difficult from a cognitive perspective to coordinate both listening to the speaker and reading the text while interpreting, if the speech script is provided less than five minutes before. However, if the text is given ten to fifteen minutes before or even longer before the interpreting, then interpreters would have good coordination between listening and reading. In fact, this response result matches Lambert's (2004) previous experiment in examining sight translation, sight interpretation (difference as mentioned above) and simultaneous interpreting in his pilot study. 14 interpreting students at the same level of translation training were asked to do SI with a text given

and had ten minutes for preparation. The result showed that students, though lacking in experience, achieved high scores for sight interpretation. Lambert (2004, p. 303) concludes that little or no interference should occur if the speaker follows the sequence of the actual text, while the risk of interference increases when the speaker decides to stray from the script, which invariably occurs in real-life situations. In order to cope with this situation, the interpreter can fully focus attention on the incoming message instead of looking at the written text. Besides, the interpreter might have had an idea of the speech if s/he was given the script before the speaker's delivery for preparation, such as highlighting certain terms, untangling the embedded syntax and to some extent knowing the intention of the speech.

Though the number of participants was limited, it still showed that the similarity between the text received by interpreters and the actual delivery by the speaker had an impact on the performance of interpreters.

1.2.3 Input variables

Apart from comprehension and simultaneity that will influence the performance in SI, there are also some other factors that might have an impact on the SI output. As Gile (1990, p. 35) notes,

> [...]interpreters have asserted that the following parameters influence their performance: source language, speed of delivery, style, degree of specialization of the speech, speaker pronunciation, environmental noise, temperature in the booth, visibility of the speaker and the conference room, prior knowledge of the subject, general mental condition and state of health of the interpreter, including his physical condition, his experience, talent, honesty, personal relations between team members, the number of delegates listening to the interpretation, organizers' and the delegates' attitude towards the interpreters.

Setton (1999, p. 90) further categorises variables based on the following aspects: (1) speech input ('language-in-text', including style, presentation, delivery, etc.); (2) the subject (the interpreter: competence, intelligence, preparedness and motivation) and (3) the environment (size and character of the audience, feedback, comfort and technical conditions). All these variables show the challenges that may be encountered in the empirical research. Currently, many studies have been conducted focusing on variables such as speech input and the subject (e.g., student interpreters and/or professional interpreters), but rarely is research conducted on the environment perspective as mentioned above. Given the fact that the environment factor is not a variable used in the current study, the next sections only deal with some of the

important variables that are controlled in this research: speech delivery rate, noise, accent, and interpreter-related variables. These variables will also be discussed in detail with reference to the specific setting of the experiment in Section 3.4.

1.2.3.1 Speech delivery rate

Speech delivery rate is an important factor in SI research since it might pose a challenge to interpretation. The study of speech delivery rate focuses mainly on two aspects, the measurement of speech delivery rate and the impact of speech delivery rate on SI performance.

Methodologically, the counting of words per minute (wpm) (mostly used in assessment of reading speed) and of syllables per second are the two approaches used to measure the speech rate. Unlike spontaneous speech, the speech rate applied to SI must be slower due to the requirements of processing capacity (Gile, 1995, p. 172). In the past, many SI studies used wpm as a reference to define the suitable range of speech rate in SI. For example, Gerver (1975, pp. 120-121) finds it to be 100 to 120 wpm and the speed in Galli's study (1990) falls within the range of 106 to 156 wpm. Moser-Mercer (1994) points out that a delivery rate between 90 and 110 wpm would allow interpreters to understand the materials. Vančura's (2013, p. 92) recent research concludes that "everything over 160 wpm was considered fast, average/standard was between 120-160 wpm, and slow was below 120 wpm".

However, some scholars (e.g., Carroll, 1966; Roach, 2000) argue that the differing syllable structures across languages should be taken into consideration. Instead of relying on wpm solely as a reference of measuring speech rate, syllables per second would be an alternative way. This is because most of the past studies used wpm as a reference and completely neglecting syllables per second may not define a range of optimal speech delivery rate.

In the Chinese language, the measurement of speech delivery rate is different. Chinese also has syllables. As one of the features of Chinese, each syllable is associated with a meaning as well as a Chinese character. A syllable consists of an initial, a vowel and a tone. For example, bus station/train station or bus stop/train stop is chēzhàn (车站) in Chinese: the syllable chē (车) means vehicle and the syllable zhàn (站) means stand (Ross & Ma, 2006, p. 6). While in English, for instance, the word lettuce includes two syllables *let* and *tuce* but these two syllables are not units of meaning (ibid). Based on these differences, it is worth noticing that the status of the

syllable/character is more important in Chinese than in English, while the status of the word is more important in English than in Chinese. Therefore, the widely adopted measurement of speech delivery rate in Chinese language is calculated based on characters per minute instead of words per minute or syllable per second. Concerning the optimal speech speed in Chinese to English interpreting, very few studies have been carried out for reaching a conclusion in terms of the appropriate speech rate for interpretation. Nevertheless, Li (2010) proposes that 150-180 characters per minute (cpm) might be considered as an appropriate rate, which could be regarded as a reference in the stage of speech selection.

In terms of the impact of speech delivery rate, a fair number of studies have been carried out, showing the result that the speech delivery rate of SL has a significant impact on the performance of and the output produced by both professional and student interpreters in SI. For instance, Gerver's (2002) early research reports that increased speech delivery rates lead to more omissions in SI performance. Pio (2003) further clarifies in an experimental study that fast source text delivery rates have an influence on both linguistic accuracy (omissions, substitutions, additions, logical-time sequence errors which refers to the interpreter's ability to properly reproduce the logical relation among clauses, phrases or sentences of the ST in the TT) and extra-linguistic appropriateness (pronunciation and phonation, unfilled pauses, filled pauses, repetitions, corrections, false starts and ear-voice span (EVS)) for both professional and student interpreters. With the exception of additions, fast delivery rate led to more linguistic errors compared to standard delivery rate in linguistic categories. With regard to extra-linguistic categories, it can be found that fast delivery rate could cause more filled and unfilled pauses, corrections and errors in pronunciation and phonation. In terms of EVS, 8 out of the 15 subjects lengthened it in fast delivery rate conditions while 7 shortened their EVS. However, Shlesinger (2003) conducted a study from the perspective of the relation between presentation rate and working memory, reaching a conclusion that a higher rate allows less time for unrehearsed items to decay and performs better than a lower rate. Similarly, Vančura (2013) demonstrated that target text quality is not affected by fast speech rate in ST, but it is true that trainees dislike speeches which are intuitively considered to be fast and the success in rendition of fast speech is dependent on individuals. In Vančura's experiment, two interpreters were invited to interpret two fast speeches and the result showed that one interpreter who

was a naturally fast speaker performed quite well, but the other one quit the experiment after 40 seconds, saying, "I'm not able to follow the speech, it's too fast." (ibid)

Since directionality is the focus of the current study and delivery rate is a factor that influences the performance of interpreters, delivery is controlled in the current study in order to minimise its impact. Further discussion on how delivery rate is controlled is presented in Section 3.4.4.

1.2.3.2 Accent

Apart from the fast delivery rate, the accents of speakers are widely accepted in interpreting literature to potentially pose a challenge to SI interpreters and have an impact on the quality of SI. This claim is investigated and shown in Cooper et al.'s (1982) stress study which found that 70% of a population of 886 subjects expressed that an unfamiliar accent of a speaker is considered to be one of the most stressful work-related factors.

Concerning the factor of accent, even though some research (Proffitt, 1997; Taylor, 1989) shows that interpreters had better performance if a ST was delivered by non-native speakers, several experimental studies have proven that the effect of a non-native accent on SI performance is detrimental. For example, Mazzetti (1999) examined the extent to which the interpreters were influenced by the presentation of a speaker who uses a language other than the mother tongue. The study set up three comparison groups: (1) five Italian native interpreters who interpreted the delivery of a German native speaker into Italian; (2) five Italian native interpreters who interpreted the delivery of a bilingual[3] speaker into Italian; and (3) five German native interpreters who interpreted the delivery of the same bilingual speaker into Italian. The results showed that, overall, the degraded ST presented by the bilingual speaker led to more semantically incorrect renditions performed by both German native and non-native interpreters. However, the number of incorrect renditions produced by German native interpreters was much lower than that of Italian native interpreters, which possibly demonstrates the significant role of the mother tongue of the interpreter. Mazzetti (1999, p. 137) attributed this phenomenon to linguistic sensitivity, as German native interpreters can easily detect the deviation produced by the non-native speaker and the correct utterance through guesswork.

[3] The speaker was from Switzerland with French as a native language, Italian as B language and German as a satisfactory C language.

Similarly, Kurz's (2008) study further demonstrated that the performance of students was largely impaired because of non-native accents and this caused more attention to speech listening and comprehension, leading to difficulties in managing and allocating other efforts, such as monitoring and production during the SI task.

Also, Lin et al. (2013), who examined Anderson-Hsieh, Johnson and Koehler's finding that deviated prosody impairs comprehension in comparison with problematic phonemics and syllable structure, found that (a) comprehension was hindered by phonemics and prosody, and the latter was impacted the most; (b) the comprehension problem triggers reflected in the experiment were rhythm, intonation and deviated North American English post-vowel /r/. Although all the empirical studies mentioned above show that accent has a significant impact on SI performance, Han and Riazi (2017) point out that it is not certain if any other specific aspects of SI performance except for fidelity are affected, or if accent will impact both professional and student interpreters in the same way. By adopting the mixed-methods approach, namely a qualitative and quantitative analysis, they found in a sample of 32 professional interpreters that interpreters made more comments on negative effects of the strong accent compared with the non-accent speech if the delivery rates of both speeches were slow. A common problem reflected in accented speech is the deterioration in listening and comprehension, which is consistent with Kurz's study (2008). As the interpreters recalled (Han & Riazi, 2017, p. 251), the interpreter needed to direct their attention to listening (due to the accent) and the interpreter could not monitor what s/he had said effectively. This negatively affected information completeness and accuracy. Another interpreter expressed it as "your train of thoughts was no longer smooth. You have to think about what she tried to express, and you need to split some attention to attending to that."

All the research mentioned above approached the question by using non-native speakers as a variable in their experiments, while Sabatini (2000) approached it from the perspective of non-standard speeches, namely asking interpreters to interpret speeches given by an Indian speaking English as a second language and an American speaking English as a native language with a strong accent. The result of the study explicitly showed that among the three required tasks, including listening comprehension, shadowing and SI, listening comprehension demands the least processing capacity in comparison with the other two. The study also demonstrated

that both non-native language and native language with strong accent in the source speech are a potential problem trigger for the interpreters.

According to Pöchhacker (2016, p. 129), accent in fact is not only confined to non-standard pronunciation of phonemes but also can be extended to deviations at all levels, including supra-segment (i.e., stress, tone), lexis and syntax. As explained by Gile (1995, p. 176) in the Efforts Model, bad pronunciation by a non-native speaker could lead to devoting more processing capacity from interpreters in the aspect of Listening and Analysis Effort, and this would result in either overload of Memory Effort (resulting in information loss) or the difficulty of production (resulting in the deterioration of output quality or less devoted efforts in listening and analysis).

1.2.3.3 Noises

Alongside speech delivery rate and accent, noise is also one of the variables that may influence the performance of simultaneous interpreters. However, the study on the impact of noise on SI is rather limited. I am only aware of an experiment on noise carried out by Gerver (1974), who asked twelve professional interpreters to interpret French prose into English in an environment with different degrees of noise, including environments with no noise, moderate noise and high noise. Gerver (1974) found that interpreters were highly affected in the noisy environment and they were less likely to detect and correct errors due to the demanding efforts of paying more attention to the process of receiving information.

1.2.4 Other variables

Other variables, primarily physiological stress such as fatigue or the health conditions of interpreters and ear preference/hemispheric dominance also have a potential impact on the performance of simultaneous interpreters, and on the experiment results as well. As mentioned earlier in Section 1.2.2.1, the nature of SI in terms of highly cognitive attention will lead to stressed brain capacity; this partly explains why interpreters take turns to interpret for roughly 15 to 20 minutes and then take a break. Kurz (2003) further explored the physiological stress in SI by comparing expert and novice interpreters. Apart from the common problem of working in a booth for long hours with regard to CO^2 levels, humidity and temperature, interpreters were also exposed to physical exhaustion, cognitive fatigue and mental stress. Compared with novice interpreters, experts might have learned to overcome their ‘stage fright’ with accumulated experience and tolerance for the stressful task.

Lambert's (1993) study on earedness (i.e., preference of left or right ear) and simultaneous interpretation found that information was processed more efficiently by interpreters via either a left or right ear than via two ears, and the left ear was overwhelmingly preferred by right-handed interpreters. These findings were further confirmed by her finger-tapping experiment (press the key as quickly as possible by using the right index finger first and then left index finger while performing a concurrent verbal task such as shadowing or SI at the same time). However, the study by Hamers et al. (2002) indicated that the quality of interpretation is also affected by the number of years of experience, as experienced interpreters yielded much higher scores in the experiment and it had nothing to do with ear preference or the hemispheric control of interpretation.

1.2.5 Working memory

Baddeley and Hitch (1974) proposed the concept of working memory as a modification of the concept of short-term memory. Working memory is interpreted as "the immediate memory processes involved in the simultaneous storage and processing of information in real-time" and has been shown to correlate highly with first language reading skill (Harrington & Sawyer, 1992, p. 26). The difference between working memory and short-term memory lies in that the former one involves the procedure of storage, processing and executive control of the cognitive process, while the latter one is just a simple storage of information (Timarová, 2008, p. 1).

According to Timarová (2008), more than a dozen working-memory-related models have been introduced and developed since the 1970s - for instance, the multicomponent model by Baddeley (2000), the long-term working memory model by Ericsson and Kintsch (1995) and the long-term memory activation model by Cowan (1988). In terms of working memory models that are related to interpreting, it should be noted that a common feature of most theoretical models of working memory lies in the focus on storage functions (Timarová, 2008). For example, Gerver's model (1975) focuses on the short-term storage of the source text in an input buffer before continuing further processing, and this buffer is also used for storing a segment of the input text when interpreters are engaged in dealing with the previous segment. In Moser's model (1978), working memory plays both structural and functional roles, as it could either store processed information in a syntactic and semantic level or perform a recoding task, such as linguistic transformation. Darò and Fabbro's model (1994) also centres

on memory and they think the actual translation processes involve two different modules; that one module serves for one translation direction, namely either from a non-native language into the native language or vice versa.

Research into working memory has always been a prominent topic in interpreting studies, especially cognitive research. Within the framework of theoretical models, several studies regarding working memory have been carried out from the following perspectives: relation between working memory and expertise (e.g., Liu et al., 2004), impact of presentation rate (e.g., Shlesinger, 2003), language proficiency and training on working memory (e.g., Tzou et al., 2012), and the influence of task and age on working memory (e.g., Signorelli et al., 2012).

Liu et al. (2004) conducted a study to examine if interpreters with similar general cognitive abilities or working memory capacity but different skills would lead to differences in SI performance in an English-Chinese language pair. The study included eleven professional interpreters with at least two years' professional experience, as well as at least 40 working days per year, and 22 student interpreters who were either at the end of their first-year or second-year training. The results showed that professional interpreters consistently outperformed student interpreters, and this is because strategies such as selecting useful information for SI processing and relevant specific knowledge help professional interpreters achieve better performance when the level of working memory capacity is roughly the same between professional and student interpreters. Apart from that, professional interpreters, based on their rich experience, have developed their working memory so that they can process the information in a different and more efficient way compared with student interpreters.

As for factors such as presentation rate, language proficiency and formal training, Shlesinger's (2003) study found that professional practitioners retained slightly more modifiers under the speed of 140 wpm than those under the speed of 120 wpm. It is believed that storing high-density strings, which are composed of a noun preceded by four successive SL modifiers, will impose a heavy cognitive load on interpreters. Even though slower presentation rates would allow interpreters to retrieve more TL replacements from long-term memory, there is still a risk of greater trace decay. Thanks to their accumulated experience of interpreting, professional interpreters are more flexible and more efficient in prioritising the incoming information and making decisions in terms of what to retain or discard.

Tzou et al. (2012) tested the impact of second language proficiency and length of formal training on the SI performance and working memory of Mandarin-English student interpreters (11 with one year of formal interpreting training and nine with two years of formal interpreting training) and 16 untrained bilinguals. They noticed that students with two years of formal training largely outperformed those with one year of training and bilinguals. Advanced L2 users and those individuals, regardless of whether they received interpreting training or not, who have a high memory span performed better in the SI task. Finally, working memory span correlates with L2 proficiency as the greater the L2 proficiency, the higher the working memory span is too. Therefore, they arrived at the conclusion that language proficiency might explain the reason why differences exist in interpreting performance and working memory, and it is formal training that may help improve language processing skills rather than working memory (Tzou et al., 2012).

Signorelli et al. (2012) examined the differences among 47 multilingual adults (12 younger interpreters with ages ranging from 30-40; 11 younger non-interpreters with ages ranging from 26-41; 13 older interpreters with ages ranging from 46-67; 11 older non-interpreters with ages ranging from 48-81) in terms of skills of sub-vocal articulation, non-word repetition and cued recall for phonological and semantic information, as well as the contribution of age to differences of working memory. The results demonstrated that compared with non-interpreters, interpreters showed better performance in reading span and non-word repetition, while in other tests, there were no visible results found in cued recall and articulation rate. Younger interpreters slightly outperformed non-interpreters or older interpreters in non-word repetition and cued recall, which indicates that age is one of the possible factors that influence the working memory, but this might be subject to sex and education level, according to a recent psycholinguistic study by Pliatsikas et al. (2019).

The studies mentioned above show that a better performance in working memory is related to interpreters' work experience, training, age and L2 proficiency, and the working memory capacity of interpreters and that of non-interpreters is likely to be the same. It seems that decision-making skills or strategies, which will be discussed in the following section, might be more important in achieving the success in SI than working memory capacity.

1.2.6 SI strategies

SI strategies are named as "coping tactics", which is a term used by Gile (1995) to refer to conscious solutions that interpreters take to compensate for the overload of processing capacity and the inadequacy of knowledge base. Similarly, Kohn and Kalina (1996, p. 132) believe that the behaviour interpreters adopt through interpreting strategies is an automatic process, as this will give them "enough capacity and attention to solve the more intricate and complex problems." Pöchhacker (2004, p. 133) thinks that interpreting strategies are composed of on-line strategies (e.g., comprehension strategies) and off-line strategies (e.g., knowledge acquisition). Given the number of studies regarding SI strategies adopted by interpreters, it is clear that a fair amount of attention has been paid to this topic in interpreting studies. In this section, a discussion on the classification of SI strategies and representative studies focusing on one or more strategies will be presented.

1.2.6.1 Categorisation

In Gile's classification (1995, pp. 192-201), coping tactics include comprehension tactics, preventive tactics and reformulation tactics.

Comprehension tactics are mainly used when interpreters have to face problems caused by the pressure of time and processing capacity. They include: (a) delaying the response; (b) reconstructing the segment with the help of the context; (c) using the boothmate's help; and (d) consulting resources in the booth. As for preventive tactics, these can be known from the literal meaning that interpreters will take measures when they think a problem may occur due to time-related or processing capacity-related pressure. Interpreters may use tactics such as, (a) taking notes; (b) lengthening or shortening the ear-voice span (EVS); (c) segmentation and uploading of short-term memory; and (d) changing the order of elements in an enumeration, to deal with the pressure and risks of output deterioration.

Reformulation tactics generally can be explained as the process of reformulation of the speech content through various means, which consist of: (a) delaying the response; (b) using the boothmate's help; (c) consulting documents in the booth; (d) replacing a segment with a superordinate term or a more general speech segment; (e) explaining or paraphrasing; (f) reproducing the sound heard in the source-language speech; (g) instant naturalization; (h) transcoding; (i) form-based interpreting; (j) informing listeners of a problem; (k) referring delegates to another information source;

(l) omitting the content of a speech segment; (m) parallel reformulating; and (n) switching off the microphone (Elsebaei, 2013, pp.41-44).

Kohn and Kalina (1996) distinguish the strategies based on the comprehension of source discourse and the production of target discourse in SI. Kalina (1998, pp. 115-121) proposes that comprehension-enhancing strategies include preparation strategies, inference, anticipation, and chunking. TT production strategies include ST conditioned strategies (syntactic transformation and transcoding), TT conditioned strategies (EVS, text compression, text expansion, stylistic strategies, presentation strategies), emergency strategies (compression, which is composed of selection, deletion, generalisation and simplification), repair strategies (self-correction and decision for no-correction) and global strategies (monitoring).

According to Riccardi (2005, p. 765), comprehension, production, overall and emergency strategies are the most common categorisation in SI: (1) comprehension strategies: anticipation, segmentation, selection of information, and stalling or waiting; (2) production strategies: compression, expansion, approximation strategies, generalization, use of linguistic open-end forms, morphosyntactic transformation and the use of prosody elements, such as pauses and intonation; (3) overall strategies: décalage (time lag) and monitoring; and (4) emergency strategies: the omission of text segments, transcoding and parallel reformulation.

Based on the categorisations provided by Gile (1995), Kalina (1998) and Riccardi (2005), it can be noted that the processes of comprehension and production, in fact, involve more interpreting strategies. In particular, the category of production strategies mentioned above is composed of almost all occurrences observed in the interpreting performance. Therefore, the following sections review the frequently discussed strategies in SI – chunking and anticipation.

1.2.6.2 Chunking

Chunking, also known as segmentation, saucissonnage or the salami technique, is defined as, "the process whereby interpreters segment the input into smaller fragments that can be encoded without having to wait for the entire sentence to unfold" (Seeber & Kerzel, 2012, p. 231). The reasons for using the chunking strategy in SI can be, for example, to avoid lagging too far behind the speaker, or to save efforts when the speaker does not follow the text or when no script is available to interpreters. In other words, chunking strategy might be regarded as an indirect representation in

compliance with the law of least effort proposed by Gile (1995). Therefore, in order to maintain the performance and not to be affected by the overload of memory, chunking is believed to be one of the most effective interpreting skills, not only in helping interpreters unload memory burden without trapping themselves, but also in facilitating comprehension and analysis by the interpreter (ibid).

Generally, chunking can be done based on meaningful units of information, namely segmenting the information into grammatical constituents (e.g., nouns and verb phrases), so that interpreters can analyse and produce the information while listening to it actively.

The example below explains how chunking can be done when interpreting from English into Chinese (Setton & Dawrant, 2016, p. 214):

Input	Chunked output	(literal English gloss)
It is now over 12 years	十二年多以前，	*More than 12 years ago*
since Hong Kong entered the new constitutional order	香港开始实行新的宪政安排，	*Hong Kong began to implement new constitutional arrangements*
as part of China	成为中国的一部分，	*becoming a part of China,*
under the principle of "one country, two systems". During this period,	奉行一国两制的原则。在此期间	*applying the principle of one country, two systems. During this period*
judicial independence has been universally recognized	司法独立一直被公认为	*judicial independence has universally been recognized*
and accepted to be of pivotal importance to Hong Kong.	是对香港至关重要的	*to be extremely important to Hong Kong*
The constitutional guarantees	宪法中保障	*Within-[the]-constitution guarantee[d]*
for an independent Judiciary	司法独立的规定	*rules of judicial independence*
have been fully implemented.	也得到了全面的实施	*have also been fully implemented.*

From the above example, it can be noticed that the interpreter is not constrained to the grammatical format of the original speech. Prepositional phrases such as "under the principle of 'one country, two systems'" and "for an independent Judiciary" are flexibly rendered as either a verb sentence or a noun phrase. If it is translation, then the whole sentence structure needs to be changed in the TT, as prepositional phrases need to be translated and appear at the beginning of each sentence. Apart from this, as Ma (2013, p. 1235) states, the extraction of key words from the speech is the external representation of chunking, as key words are the clue that can help interpreters sketch an outline of the message to be conveyed. However, if interpreters want to represent the full message in the speech, logical links would serve as a thread that links all the key words to help interpreters memorise the multiple short chunks to be interpreted (ibid).

Yagi's (2000) study examined chunking as a quantifiable stylistic feature, as the comparison between the number of the speaker's chunks and that of the interpreters can indicate the extent to which the interpreters reformulate the source speech. If the number of the speaker's chunks is less than that of the interpreters, that means the interpreter segments the source speech regularly, instead of joining small chunks into big ones. With an observation of the performance of shadowers, novice and professional interpreters in the experiment, one of the results shows that the number of pauses by professionals was almost the same as that of the speaker, while novice interpreters had more pauses. This means that the target text produced by novice interpreters tended to be more fragmented or less fluent in comparison with that interpreted by professionals, which indicates the latter group was more adept at controlling reformulation. As for the shadowers, one shadower was more like the professionals while the other was like the novices.

1.2.6.3 Anticipation

As one of the most frequently used and discussed strategies in SI, anticipation means "the prediction of source-text constituents not yet available for the interpreter's output planning" (Liontou, 2015, p. 15). Similarly, Van Besien (1999, p. 250) defined it as "the production of a constituent (a word or a group of words) in the target language before the speaker has uttered the corresponding constituent in the source language". Interpreters use anticipation when they are faced with the challenge caused by syntactic asymmetry, such as interpreting from a language with a structure of SOV

(subject-object-verb) into a language with an SVO structure. This is why anticipation is not only particular to SI mode, but also a phenomenon when the frequency of the use of anticipation, as a key SI strategy, depends on specific language pairs.

The studies of anticipation include languages such as German (e.g., Hodzik, 2013; Jörg, 1997; Seeber, 2001; Van Besien, 1999), Chinese (e.g., Chang, 2005; Setton, 1999) and Japanese (e.g., Gile, 1992), among which German is the most frequently studied language in this aspect. It is believed that verb phrases in German can be split by many elements, such as complement phrases and relative clauses, and this might be an obstacle for interpreters to follow an SVO pattern when interpreting into English. Jörg (1997) examined verb anticipation in German>English SI through an empirical investigation. In the experiment, six student interpreters (three were English and three were Austrian) and six professional interpreters (three were English, two were Austrian and one was German) simultaneously interpreted the text delivered by German president Roman Herzog in 1995. As explained by Jörg, the content of the text was a political speech in a general domain, which did not require any preparation beforehand and the speed was 115.23 words per minute, which falls into the category of optimal input rate provided by Gerver. Based on the performance of 12 participants, the results showed that, of 312 anticipation possibilities in the corpus, the number of successful anticipations/exact (93) and successful anticipations/more general (63) was equal to the total number of no anticipation (149) and incorrect anticipation (7), and indicated that anticipation occurred when interpreters were relatively sure about the coming verb. In terms of the number of verb anticipations (altogether 163 regardless of the correctness), verb anticipation plays an important role in the interpretation from German to English. Similarly, Lederer's (1981) corpus study also found that only 20% of anticipations from German concerned other constituents, whereas 80% concerned verbs. As for the individual performance, the research found that professional interpreters anticipated more accurately than student interpreters. Also, anticipation processes performed better when working from the mother tongue, with 35% of successful anticipations/exact for German mother tongue speakers who interpreted from German into English over 24% of that for English mother tongue speakers in the same interpreting direction. This result confirmed the findings in Chernov's (1978, p. 82) experiment about probability prediction, that 50.89%, as opposed to 28.68%, of predictions were made when interpreting from the mother tongue.

Seeber (2001) further tested the hypothesis of the negative effect of monotonous intonation on verb anticipation for the same language pair and interpreting direction. He points out the role of intonation in the German language for grammatical purposes and pragmatic functions, due to the reason that the distribution of pitch accents can allow interpreters to tell the syntactic structure, either left branching or right branching. Although the results from his experiment failed to prove the hypothesis, it shows that interpreters could anticipate the verb more accurately and rapidly under the condition of monotonous speech rather than under that of lively speech. The reason for this phenomenon might be explained as interpreters needed more cognitive efforts under the condition of monotonous speech and adopted a conservative strategy by using placeholders[4] to avoid the errors caused by verb anticipation.

In a recent study conducted by Hodzik (2013) on the prediction of the head-final verb from the aspects of constraining context and transitional probability from German to English, 12 English native speakers from the University of Cambridge were examined by participating in both shadowing and SI tasks. For the results obtained in SI in particular, the researcher reached the conclusion that interpreters used a highly constraining context as a cue to predict the sentence-final verb in SI and it could also help interpreters to produce the verb in the target output even before the verb appeared in the source input, whereas transitional probability did not play a role in prediction during German>English SI. As explained by Hodzik (ibid), the failure to demonstrate the effect of transitional probability on verb anticipation is because the syntactic structures between German and English are not symmetrical, as interpreters needed to convert the noun-verb structure in the German input into verb-noun structure in the English output. In other words, the symmetrical structure between one language and another, such as French and English, might be able to prove a transitional probability based on the relationship between words through word-by-word interpreting.

In Asian languages, a very limited number of studies focus on Mandarin Chinese (e.g., Chang, 2005; Setton, 1999) and Japanese (Gile, 1992). Setton (1999) found in the Mandarin Chinese-English SI corpus that long-range deductive anticipation was used when the speech structure was discursive, and interpreters may say the conclusion even before the speaker, based on the logical anticipation. Chang (2005) noticed from

[4] Placeholder means "whenever the interpreter produced a general 'all-purpose' verb allowing him/her to continue the sentence (in some instances qualifying it at a later stage)" (Seeber, 2001, p. 78)

her study that participants who were dominant in Chinese reported to use anticipation frequently when interpreting from English into Chinese, which indicated that anticipation might be consciously used when interpreting from a non-dominant language, because the cognitive overload is not as much as interpreting from a dominant language. It is interesting to notice that Chang's finding regarding anticipation in English-Chinese direction is the opposite of what has been discussed above in Lederer's and Chernov's results. In the study of predictable sentence endings (PSE) in the language pairs between Japanese and European languages, including English, French and German, Gile (1992) summarised that PSEs exist in a larger number in Japanese in comparison with the rare number in English and French, and a frequent number in German. Also, PSEs appear at the very end of the sentence, which is very similar to German sentence structure. He affirmed that interpreters managed to interpret the whole sentence, even if it was still being uttered by the speaker, with the adoption of having anticipated a long PSE.

Overall, the above-discussed examples are a selection of studies that have been carried out on the criteria of SI strategies. It should be noted that the methodology involved in researching anticipation, regardless of its language pairs is varied, mainly entailing qualitative observational studies, quantitative corpus-based research and experimental research.

1.3 Summary

This chapter provided an extensive review of the available literature on SI, starting from the differences between translation and interpreting and between CI and SI, which demonstrate that SI is a complex and highly demanding activity from the cognitive point of view. This was followed by the illustration of cognitive processes in SI, including comprehension, simultaneity, input and other variables, and working memory, as well as SI strategies, which clearly explains how SI works from the beginning of understanding of input to the production of output, and shows the factors that will influence the performance of SI, as well as what strategies can be adopted to tackle the problems. In the next chapter, the focus will be on directionality and the relevant studies in SI.

Chapter 2 Directionality and SI

This chapter provides a review of the definition of directionality, together with a discussion of the impact of directionality on translation and language acquisition, as well as relevant international rules and/or regulations regarding directionality in translation and interpreting practice. The chapter will also discuss in general terms the influence of directionality on interpreting from four perspectives based on existing/current literature, and explore whether SI performance is affected by directionality and to what extent.

2.1 Definition of directionality

In translation studies, directionality is defined as "whether translators are working from a foreign language into their mother tongue or vice versa" (Beeby Lonsdale, 2009, p. 84). In fact, there has been no consensus reached so far in terms of terminology that is used to describe directionality. "In English the unmarked direction of translation is into the mother tongue or language of habitual use" (Beeby Lonsdale, 2009, p. 84) and the other direction is prose translation. For German, Russian and Japanese, they do not have this specific terminology for directionality, while Spanish, Italian and Chinese use "direct" or "inverse", which means into the mother tongue or into the foreign language respectively (ibid). However, the use of inverse is criticised by a research group at Granada University as this word has a negative connotation (Kelly et al., 2003, pp. 37–40), and suggest the use of A, B and C languages as proposed by the International Association of Conference Interpreting (AIIC), as this allows more language directions and variations. For instance, both Catalan and Spanish can be a translator's "language of habitual use" and both of these languages can be represented as A language in this context (Beeby Lonsdale, 2009, p. 84).

In interpreting studies, directionality means interpreting direction, and the discipline generally adopt the AIIC terminology to differentiate language proficiency. In these studies, directionality, together with other elements such as speech delivery rate, accent and noises, belong to the category of input variables, as discussed in Section 1.2.3. Directionality "contrasts interpreting into one's native or A language (from another active working language, or B language, or from a so-called passive, or C language) with interpreting out of one's native language into a B language (into-B interpreting, retour interpreting)" (Bartłomiejczyk, 2015, pp. 109-110). According to

the most recent language classification provided by the AIIC, the definition of A, B and C language is as follows[5]:

> Active languages:
>
> A: The interpreter's native language (or another language strictly equivalent to a native language), into which the interpreter works from all her or his other languages, and as a general rule, in both modes of [conference] interpretation, simultaneous and consecutive.
>
> All members must have at least one 'A' language but may have more than one.
>
> B: A language other than the interpreter's native language, of which she or he has a perfect command and into which she or he works from one or more of her or his other languages. Some interpreters work into a 'B' language in only one of the two modes of interpretation.
>
> Passive languages:
>
> C: Languages, of which the interpreter has a complete understanding and from which she or he works.

According to AIIC (n.d.), active languages, which include both A and B languages, are languages that interpreters speak fluently and naturally. As for passive languages, which here are referred to as C languages, they are languages that interpreters understand perfectly but could not speak fluently. Based on the definition provided above and the working rules in AIIC, it can be concluded that an interpreter is often allowed to work from B and C language into A language, and sometimes from A and C into B language. However, it is not acceptable to work from either A or B into C language. In fact, the issue of directionality is mainly discussed in conference interpreting, particularly in SI, as it often involves one interpreting direction in a given speech in a formal setting (Bartłomiejczyk, 2015, p. 109).

As directionality is the focus of the current study, as well as one of the recurring themes in the field of translation, the next few sections will provide a detailed review of the studies that have been conducted regarding directionality.

2.2 Directionality and translation

Among the theoreticians (e.g., Donovan, 2005; Seleskovitch, 1968) who believe that translators should only translate into his/her A language, Newmark's comment on translation direction is often quoted to represent an assumption in linguistics that native speakers of a language "have an automatic feeling for the connotations of words, for folk etymologies, for what is appropriate to various domains, for the import of a range

[5] https://aiic.org/site/world/about/profession/abc

of speech acts, in general for appropriate membership behaviour in him/herself and of implicit—and very rapid—detection of others as being or not being members" (Davies, 1991, p. 94). As Newmark (1981, p. 180) notes, the unnatural and non-native translations will be reflected in "unacceptable or improbable collocations" instead of "grammar" or "vocabulary". Similarly, Marmaridou (1996, p. 59) believes that "a professional translator is usually asked to, and prefers to translate into his or her mother tongue", as the translation quality is normally higher than with other working languages. The dominant opinion of translating into one's mother tongue seems to be widely adopted among practitioners, as well as some professional associations or international organizations in spite of the difficulties of defining what a mother tongue is. For example, ATIA (n.d.) has explicitly ruled that "members are urged to translate into their mother tongue only or into their language of habitual use". In *Translation: Getting it right—A guide to buying translation* published on the website of the Institute of Translation and Interpreting (ITI), it states very clearly that "professional translators [should] work into their native language" (ITI, 2011). UNESCO published *Recommendation on the Legal Protection of Translators and Translations and the Practical Means to Improve the Status of Translators* in 1976 and it stipulates that "a translator, as far as possible, should translate into his or her mother tongue or into a language of which he or she has a mastery equal to that of his or her mother tongue" (Picken, 1989, p. 245).

In spite of the long-existing standpoint of translating into A language, many empirical and descriptive studies have started to emerge to discuss and challenge the traditional viewpoint mentioned above. For instance, Pokorn (2004) designed a questionnaire to test if a non-native translator can always be identified by a native speaker, and if so, what the important elements that lead to the detection would be. The questionnaire included seven fragments of different English translations of a work written by a Slovene writer. Two texts were translated by Slovene native speakers and two texts by English native speakers. Three texts were translated by three pairs of translators: (1) a native Slovene speaker and an English native speaker; (2) a person who was not a native speaker of Slovene but was familiar with this language and a native English speaker; (3) a person who is a second-generation Slovene immigrant in the US and a native American English speaker. In this study, Pokorn (2004) found that, for the English native speakers who filled in the questionnaire, they could not always

detect the unnatural elements, and this was even true when it comes to translations done by pairs of translators, as the readers found no traces of foreign or unnatural expressions. Therefore, this study does not support the assumption in linguistics that native speakers can automatically detect unnatural and non-native language use.

Some of the studies analyse directionality by focusing on the translation process and provide a descriptive view of this issue. Pavlović (2007) studied directionality in the collaborative translation process by taking novice translators as participants, with the aim of comparing the differences that exist when translating from L1 into L2 and L2 into L1 respectively, as well as enhancing translation teaching. All the participants were native Croats and had been learning English for at least 12 years. In the study, the results showed that similar problems were encountered in comparable non-domain specific ST in both translation directions, and the actions/interactions that participants took were similar. Nevertheless, participants produced more fluent rendering in L1 translation and were more competent in monitoring L1 output than L2 translation. Accordingly, L1 translation was of higher quality. Apart from this, the study also demonstrates that collaborative translation produced by novice translators are likely to be better than that produced by individuals, even though similar problems were encountered in ST, regardless of adopting collaborative or individual methods.

Some studies such as Pavlović and Jensen (2009) have used eye tracking to investigate translation directionality. They mainly tested five aspects, namely the cognitive effort used in processing ST and TT in both translation directions; the whole cognitive effort required for processing L1 task and L2 task; the cognitive effort invested in processing ST in L1 task and L2 task; the cognitive effort invested in processing TT in L1 task and L2 task; and the amount of cognitive effort that students and professionals invest in both translation directions. For the aspects examined, the research did not provide any definitive conclusions, except that TT production requires more effort in both L1 and L2 tasks, with the other four aspects partially tested.

More recently, Hunziker Heeb (2016) studied this issue from the perspective of a cognitive model by means of comparing differences that were shown in professional L2 translators and L1 translators in German-English translation. It proved that the quality of L2 translation is not necessarily inferior to that of L1 translation, which is in contrast to the findings in Pavlović's study.

Besides process-oriented studies, Wang's (2011) research on directionality focused on the historical perspective by outlining the major translation projects conducted in China, with a conclusion that translation from L1 to L2 language has a long history, which can be dated back from 2nd-19th century A.D and has three peak periods of Chinese-style team translation which include the Buddhist scripture translation (2nd-9th c.), the Jesuit translation activities (16th-17th c.), and the introduction of "Western learning" (latter half of the 19th century).

To sum up, the studies mentioned above did not provide strong evidence that the quality of A-to-B translation is significantly inferior to B-to-A translation.

2.3 Directionality and other translational activities

There are some other translational activities, such as signed language interpreting (SLI) and sight translation. This section briefly discusses the current available studies on the relation between directionality and SLI, and the relation between directionality and sight translation.

SLI used to function as a separate entity from both translation and interpreting in the past, but now it is regarded as another community language that translation and interpreting practitioners work with (Napier, 2011, p. 353). It is worth noticing that SLI has some unique characteristics including directionality, modality, techniques, and its settings (ibid). There exist some studies (e.g., Wang & Napier, 2015) focusing on directionality as one of the unique characteristics and investigating the influence of directionality on SLI. Wang and Napier (2015) investigated the impacts of directionality and age of signed language acquisition on signed language SI performances of native and non-native professional English/Auslan (Australian Sign Language) signers. They concluded that no significant differences were found on the SI performance of native and non-native signers, although native signers performed better in both the TT features and delivery features of English-to-Auslan SI.

Nicodemus and Emmorey (2015) conducted a study on the accuracy and articulation of interpretation output in L1 (English as their mother tongue) and L2 (American Sign Language) among 30 interpreters (15 novice and 15 experts). The results of the experiment showed that novice interpreters performed much better into L1, while expert interpreters had equal accuracy and similar articulation quality in both directions; also, no connection was found between interpreting performance and direction preference.

Van Dijk et al. (2011) also aimed to investigate the directionality effects in SI by taking sign language interpreters in the Netherlands as a case. They examined the quality of interpretations produced by 25 experienced interpreters with more than 10 years' experience from spoken Dutch to Sign Language of the Netherlands (SLN), spoken Dutch to Sign Supported Dutch (SSD) and SLN to spoken Dutch. The findings indicated that the quality of Dutch-to-SLN and Dutch-to-SSD interpretations was better than that of SLN-to-Dutch interpreting, which might be due to the difficulty of interpreting from SLN to Dutch as interpreters had little experience in this direction.

As mentioned earlier in Section 1.2.2.3, sight translation is defined as an activity that "involves the transposition of a message written in one language into a message delivered orally in another language" (Lambert, 2004, p. 298). He et al. (2017) used functional near infrared spectroscopy (fNIRS) to study the brain activation patterns in relation to Chinese-English sight translation, making a breakthrough in methodology by offering a new way of researching the relation between sight translation and directionality. They collected data from 11 postgraduate students who majored in translation studies from the University of Macau and scored over 80 in both English and Chinese screening tests, and found that sight translation from L1 (Chinese) into L2 (English) showed more brain activation in Broca's area (in the frontal lobe of the dominant hemisphere, which is linked to speech production), which indicated the relation between neural correlates of translation and direction of sight translation. Also, in L2-to-L1 translation, the pronounced brain activation in the left pre-frontal cortex (PFC) suggested the importance of this region. This suggests that the brain activation is different when interpreters work in different language directions.

2.4 Directionality and interpreting

This section explores the issue of directionality in interpreting research from three perspectives: arguments against or in favour of A to B interpreting (Section 2.4.1), empirical studies on interpreting direction, including interpreters' preference, teaching activities and interpreting process and production (Section 2.4.2), and a discussion of the theoretical foundations of the Effort models, tightrope hypothesis and processing capacity-related problems (Section 2.4.3).

2.4.1 Arguments about interpreting direction

This section further discusses the arguments for and against the AIIC proposal explained in Section 2.1.

2.4.1.1 Arguments against A to B interpreting

As in translation studies, the issue of directionality has been contentious in interpreting studies (e.g., Déjean Le Féal, 2005; Denissenko, 1989; Donovan, 2005; Seleskovitch, 1968). The view that the quality of interpreting from A into B language is inferior to that of from B into A language is based on "a mix of personal experience, ideology and tradition" (Gile, 2005, p. 10).

The Paris School, as the representative of Western Europe, is strongly against interpreting into B language, which is also widely known as retour interpreting (into-B language interpreting), as this activity can be more cognitively demanding, more stressful, more prone to errors, and interpreters will show less confidence and flexibility (Lim, 2005). Seleskovitch (1968), Déjean Le Féal (2005) and Donovan (2005) are among the Paris School scholars who have expressed clear views on the problems of into-B interpreting. Seleskovitch (1968, p. 43) argues that only interpreting into A language will make the production spontaneous and idiomatic. Déjean Le Féal (2005, p. 170) believes that the difficulties of interpreting into B language lie in the weakness in the acquisition of B language, and that interpreting training is not able to compensate in this aspect. Donovan (2005, pp. 152-155) argues that interpreting into B language will have the issues of expression, self-monitoring and redundancy. Under the saturation status, the lack of "native fluency, flexibility and intuition" will make the shortcomings more obvious, which can be manifested as "false cognates or the odd mispronounced term", "incorrect grammatical structures", and "the difficulty of combining expression concerns with analysis" (Donovan, 2005, p. 152). Accordingly, the monitoring process of into-B interpreting is also vulnerable due to the inflexibility of expressions and unproficiency in foreign languages. When interpreters realize the incorrect expressions they use, they are likely to have relevant concerns, become less confident, focus on the form of language rather than the analysis of ST, and make repairs for occurred errors at the cost of having no available effort to analyse (Donovan, 2005, p. 153). As a consequence, the interpretation tends to be unnatural, nonsensical, or be in an unthinking form. Apart from that, the more effort is dedicated to expression, the more inferior the quality of into-B interpreting will be, given that the output consists of redundant, over-wordy expression, corrections and hesitations (Donovan, 2005, p. 155).

2.4.1.2 Arguments in favour of A to B interpreting

In opposition to the Paris School, the Eastern School, mainly led by the ex-Soviet Union, is in favour of A to B interpreting. As Denissenko (1989, p. 157), one of the representatives of the Eastern bloc stated: "a full or near full message gotten across even if in a somewhat stiff, less idiomatic or slightly accented language serves the purpose much better than an elegantly worded and an impeccably pronounced half message or less". There are also ideological reasons supporting this view. For instance, representatives of China and Arabic-speaking countries in the UN require Chinese and Arabic interpreters to work in both directions, as they object to letting interpreters of other nationalities interpret their speeches (Fernández, 2005, p. 106).

There are also practical reasons why interpreting into-B is accepted. Even those who question the quality of SI into B such as Donovan (2005) note that the need of bilingual interpreters is driven by both institutional and private markets. As bilingual interpreters can interpret in both directions, this makes the organization of an interpreting team much easier. Apart from that, only native speakers who are interpreters of some less-widely spoken languages have the capacity to interpret into B language (ibid).

Nowadays, the market needs more bilingual interpreters who can interpret in both directions and this is especially in demand in China. Accordingly, there has been a movement to view directionality in a balanced way (Gile, 2005; Padilla, 2005). Therefore, instead of focusing on the debate of whether interpreters should only work into A language or the inferior quality of interpreting into B language, more attention can be given to the analysis of problems of the interpreting process and production when interpreting from A into B language or from B or C language into A, as well as the relevant solutions from the pedagogical perspective.

2.4.2 Empirical studies on interpreting direction

An increasing number of studies discuss the issue of directionality from the perspectives of the interpreting process and production analysis, the assessment of interpreting quality, interpreters' preferences of direction, and interpreting training (e.g., Dailidėnaitė, 2009; Mead, 2005; Padilla, 2005). The following sections provide an overview of the available literature to highlight the gap the current study aims to fill.

2.4.2.1 Interpreting process and production

Due to the nature of directionality, interpreting between two different languages can present difficulties other than lexical choices, syntactic structures and social or cultural characteristics. When these difficulties are reflected in the interpreting process, the occurrence of grammatical errors (Dailidėnaitė, 2009), pauses (Mead, 2005) and repairs (Dailidėnaitė, 2009; Petite, 2005) partially manifests the constraints of directionality on interpreters.

Padilla (2005) analysed the cognitive implications of English-Spanish SI and the crucial role of comprehension and production in the relevant adoption of interpreting strategies. Vázquez-Ayora (1977) (cited in Padilla, 2005) analysed the linguistic differences between English and Spanish, pointing out that the linguistic differences of the language pair, as well as the language direction, cause differences in speech comprehension (see Section 2.4.3.3.1) and production in SI (see Section 2.4.3.3.2), and SI into A-language might be as difficult as that into B-language. Accordingly, Padilla offers some insights in terms of training strategies and tactics for Spanish native speakers when they simultaneously interpret from English, including information condensation, permutation exercises (sentence pattern conversion) on the English morphosyntactic structure, anticipation and inference, sight translation, manipulation of the speech rhythm in order to speed up the Spanish production, and the availability of prior knowledge and terminology.

With an aim of finding out the production difficulties in A language and in B language, Mead (2005) conducted an empirical study on the correlation between directionality and fluency in CI in the language pair of English and Italian. The study comprised 45 participants, of which 15 beginners and 15 advanced students who were in their third and fourth year of degree studies respectively. Thirteen professionals had considerable professional experience, and two had recently graduated. By comparing both pause duration in seconds per minute of production and the reasons for pause explained by participants in the retrospective interview, significant differences were found when participants interpreted into Italian and into English respectively. For pause duration per minute, all three groups showed a greater mean duration pause (filled and silent pauses) in English than in Italian, and the proportion of filled pauses was more than that of silent pauses. As for the detailed explanations given by the participants for the pauses, Mead (2005) divided pauses into five categories, namely

formulation, notes, logic, no reason, and others[6]. Among these reasons, figures for linguistic (formulation: 46%) factors were much higher than those for non-linguistic factors (notes and logic: 34%) for both interpretation into Italian and into English. The overall situation for linguistic and non-linguistic factors of three individual groups was different, in that two groups of students had more linguistic problems than non-linguistic problems, while professional interpreters perceived linguistic problems as least important. As explained by the author, the reason might be due to a better language proficiency as well as the use of strategies - for example, a good balance between listening and note-taking would save more efforts for production. The paired sample t-tests also demonstrated that, in comparison with problems in Italian production, the 3rd year students and professionals but not 4th year students believed that the pauses that occurred in the interpretation into English were mainly caused by problems of formulation. Apart from this, linguistic problems happened more frequently in English, while non-linguistic problems were more obvious in Italian. This phenomenon, explained by Mead, indicates that production occupied most of the efforts in Italian to English interpretation, while participants paid more attention to comprehension difficulties and non-linguistic task management in English to Italian interpretation.

Dailidėnaitė (2009) explores this issue by examining repair types and repair frequency in SI and their potential link to directionality through an experimental study on eight student interpreters who worked from English (B) into Lithuanian (A) or Turkish (A) and from the other direction as well. The results showed the impact of directionality on the types and frequency of repairs. From a quantitative perspective, interpreters focused primarily on repairs of lexical and grammatical errors in English-into-Lithuanian interpretation, while they focused mainly on lexical and phonetic repairs in Lithuanian-into-English interpretation. More attention was paid to appropriateness repairs (see footnote 1 in Section 1.2.2.2) for interpretation from English into Turkish, while interpreters concentrated on lexical error repairs when working from Lithuanian into English. Concerning common manifestations for both language pairs, the qualitative results collected from subjects' recollection and data

[6] According to Mead (2005, p. 135), explanations of pauses were divided into five categories: (1) difficulties of formulation (lexis, grammar); (2) difficulty with notes (e.g., indecipherable symbol); (3) logical doubts (e.g., "Does this comment make sense?"); (4) no apparent reason perceived by the subject; (5) others (e.g., thinking about previous difficulties).

showed that interpreters corrected lexical, syntactic and phonetic errors based on grammar, and grammatical errors were corrected more when they worked from A language into B language. Phonetic errors were usually corrected by interpreters, because they could cause misunderstanding or ambiguity if left uncorrected. A majority of no-repairs that appeared in B language into A language were caused by comprehension problems and delivery speed. However, no-repairs in the direction of A into B, such as Turkish into English, were mainly due to lack of time, because Turkish words (Turkish being an agglutinative language) are much longer.

Bartłomiejczyk (2006) and Gumul (2017) respectively investigated the issue of directionality by examining in detail the strategies that advanced interpreting students used when working between English and Polish. Bartłomiejczyk's (2006) study involved an examination of two categories of strategies, namely product-oriented strategies and overall strategies, which included altogether 21 specific strategies. In her experimental study, she divided 36 advanced students into three groups and each group of 12 students was asked to interpret simultaneously one English and one Polish speech from one out of three sets of ST, followed immediately by retrospective remarks. She found that directionality contributed to different strategic processing in two language directions (English and Polish). For English (B) into Polish (A), it was demonstrated that inferencing, parallel reformulation, transcodage (i.e., word-for-word translation), addition and anticipation were frequently used, while syntactic transformation, approximation and paraphrase were dominant for Polish into English. As for the strategy of transfer and personal association, the frequency of use was about the same in both directions. However, it was not certain whether the prevalence of compression was due to the impact of directionality, or language-pair-specific factors such as sentence structure.

Gumul's (2017) study focused on the relation between explicitation and directionality in SI and the research design was very similar to that of Bartłomiejczyk; it also included 36 advanced interpreting students and each student simultaneously interpreted four authentic speeches, followed by retrospective remarks immediately after the interpretation. The study showed that explicitation is more evident in retour interpreting and four out of a total of 15 types of explicitating shifts occupied an extremely high proportion of Polish into English interpreting, which included connectives, addition, reiteration (e.g., lexical items; shifts from the form of paraphrase

to that of identical/partial repetition), meaning specification and disambiguation of metaphors.

The above-mentioned studies concentrated on the discussion of the impact of directionality on the interpreting process and production, with a special focus on SI. It is evident that the influence of directionality on the interpreting process is manifested in the allocation of interpreting efforts and its relevant cognitive constraints on comprehension. Phenomena such as pauses, errors and repairs all reflect the difficulties caused by language directions. Concerning the interpreting production, it is interesting to notice that most of the strategies adopted by interpreters seem to be different depending on language directions.

Section 2.4.3 further elaborates on how directionality affects the allocation of efforts in SI and the potential manifestations of capacity-related problems during the process of comprehension and production based on Gile's Effort Models.

2.4.2.2 Preferences of interpreting direction by interpreters

Examining the preferences of interpreters offers another way to look at interpreting direction, as interpreters are the direct service provider in this activity and know much better their own feelings towards directionality. A majority of the studies in this field are conducted by means of a questionnaire survey and some of the existing literature provides some insightful points.

Pavlović (2007) reports on a questionnaire survey in Croatia and investigated the attitudes of translators and interpreters regarding the difficulty of L2 translation/interpreting, personal preferences, and rates in relation to directionality. In terms of difficulty, the results based on the questionnaire showed that nearly half of the respondents (27 of the 61 respondents) found working into L1 to be easier than working into L2 and 20 respondents thought working into L2 is easier. For the remaining 14 respondents, they thought there is no difference between working into L1 and into L2. As for personal preferences, no significant difference was found, as the number of respondents with L1 preference, L2 preference and no preference of directions was about the same. At the end of the questionnaire, participants were asked to write whatever additional comments they might have regarding directionality. One simultaneous interpreter expressed that it is much easier to make quick decisions while working into L2, because the interpreter does not have as many options to choose from as she does in L1. When it comes to income or price quotation, Pavlović (2007) found

about half of the respondents claimed that no matter working into L1 or L2, interpreting direction does not bring any obvious difference with regard to payment.

Bartłomiejczyk (2004) also uses questionnaires and offers a thorough analysis of directionality in SI from interpreters' standpoints. One-page questionnaires were distributed to both interpreting students and professional interpreters. The questionnaire was completed by 53 students who were trained to interpret in both directions for more than one term (three to four months) and by 40 professional conference interpreters with experience ranging from one to 42 years, most of whom worked for the European Parliament. The survey result indicated that interpreting students and professional interpreters held significantly different views regarding interpreting into L1 and into L2. Moreover, students preferred interpreting from A into B. According to Bartłomiejczyk (2004, p. 246), the reasons behind this might be "students having too high an opinion of their own mastery of their B language", as well as not being "aware of the many errors which they do notice while interpreting into their mother tongue, and, as their B language improves, they become more critical of their retour interpreting, which can even lead some interpreters to give up the A-B combination they used to work in at the beginning of their career". Another explanation might be that "there is a stage in interpreting training where students do perform better interpreting into a foreign language" (Bartłomiejczyk, 2004, p. 247). Professional interpreters, in comparison, held the opinion that B-A language combination is superior, probably due to the fact that 87.5% of the respondents in this group were AIIC members, and working into A language is a rule, as has been discussed in Section 2.1.

2.4.2.3 Teaching interpreting into a B language

As mentioned in Section 2.4.1.2, interpreting into a B language is not only driven by markets but is also a reflection of ideologies. For example, during the Cold War, interpreting into a B language could not be avoided, since foreign interpreters were not welcomed in some countries due to "travel restrictions and other politically motivated considerations" (Donovan, 2005, p. 206). Nowadays, private-market conferences are prone to restrict usage to just two languages, namely the national language and English in most cases. The reason is because it is convenient to hire interpreters who can interpret from A into B and vice versa. Based on the researcher's knowledge about the degree courses in translation and interpreting offered in the UK, there are currently at

least five universities that offer an MA in English-Chinese Translation and Interpreting. When looking through the modules offered by these universities, it was found that almost all these universities offer interpreting modules that cover both language directions. Therefore, this brings the question – how retour interpreting can and should be taught in the interpreting training class and how it can achieve the best outcomes. The answer to this question will be further elaborated in Chapter 7 by offering some insights based on the empirically driven evidence obtained in this study.

Another important aspect worth discussing is how training strategies should be defined. Donovan (2004, pp. 206-207) proposed that four aspects be considered: (1) under what conditions is retour regarded as acceptable by users and by interpreters (greater stress, fatigue); (2) selection criteria - the challenge of predicting B language robustness in the booth; (3) specific training problems, particularly those related to the place of language enhancement; (4) more formalisation of teaching methods and definition of best practice.

Based on a survey of user experience, Donovan finds that: (1) accuracy of content is the essence, and accuracy means conveying the speaker's meaning instead of doing word-for-word translation; (2) satisfaction is expressed with fluent and fast (synchronous with the original) delivery, convincing in the rendering of the speaker's point. The degree of satisfaction was not in relation to directionality. The survey also showed that retour interpreting is not a problem for conference users, as long as the standard is maintained. When it comes to selection, Donovan (2004, p. 207) believes that "tests must be designed so as to assess robustness of the B language" and "it's particularly important to avoid forcing or even encouraging all students to work back into B, irrespective of the quality of their putative B language". For teaching methods, it is suggested that trainers put emphasis on a better understanding of problems such as interference and the temptation to be over-ambitious, instead of putting emphasis on grammatical corrections. Apart from this, a class with mixed groups, including students with different source languages and the acquisition of background knowledge of all types is all very important and these should be incorporated into the curriculum design.

Similar to part of Donovan's (2004) research, G. Láng's (2002) study also focused on language enhancement for interpreting into B and summarised four aspects to which the interpreting institutions should give importance when it comes to improving the

quality of B language. These four aspects include textual competence, presentation in B language, flexibility of TL expression, and targeted instead of general enhancement. First of all, textual competence has links to sensitivity, to naturalness and differences in register, and this ability can be developed during interpreting sessions. For example, for advanced level students, trainers can let students interpret from A to B before providing them with the B-language texts on which the speeches have been based. Secondly, presentation into B language needs to focus on clear pronunciation and marked prosodic features (e.g., stress, pitch). For flexibility of TL expression, the research indicated that students should expand their vocabulary and accumulate phrases and collocations in order to maximize the accuracy and correctness in their B language. The last aspect - targeted instead of general enhancement - means that priority should be given to most common needs and requirements in interpreting situations and actual needs of a group or individual students.

Rejšková (2002), based on her own experience, expressed that when teaching CI/SI into B, interpreter trainers should try to maximise the advantages (perception and comprehension) and make the minimum of the risks of "hampered communication" caused by less satisfying production. For example, trainers can help students analyse the actual production, identify difficulty and design a "strategy" or a "technique" to overcome problems in A-B interpretation. She suggested that each text used in class serve a general purpose (developing skills and strategies, enhancing comprehension) and a specific purpose (e.g., expanding terminology, handling intensive texts). With these texts, students are aware of the specific problems the lesson has addressed. All these aspects should be incorporated in class planning.

2.4.3 Directionality and SI

This section focuses on the introduction of the Effort Models proposed by Gile by explaining how the processing capacity-related problems occur within the given Effort Models. This section also provides a discussion on directionality and its relevance to the tightrope hypothesis from the view of cognitive load in speech comprehension and speech production.

2.4.3.1 The Effort Models

As briefly mentioned in Section 1.2.2.2, Gile (2009a, p. 160) proposed that the fundamental components of SI include Listening and Analysis (L), Production of the Source Speech (P), Short-term Memory Effort (M) and Coordination (C). The

Listening and Analysis Effort (L) contains "all comprehension-oriented operations, from the subconscious analysis of the sound waves carrying the source-language speech which reach the interpreter's ears through the identification of words to the final decisions about the 'meaning' of the utterance" (Gile, 2009a, p. 160). It should be pointed out that "the identification of words" does not necessarily mean a one-to-one relation between the sound heard by interpreters and "any single phoneme, word, or group of words" articulated by a speaker (Gile, 2009a, p. 160). Besides, it is still uncertain how far the interpreter should continue the process of the analysis of the source speech before the articulation of the TL.

The Production Effort (P) represents the output part of interpreting and refers to "the set of operations extending from the mental representation of the message to be delivered to speech planning and the performance of the speech plan, including self-monitoring and self-correction when necessary" (Gile, 2009a, p. 163). Through the observations of some studies, Gile (2009a, p. 163) believes that interpreting is difficult, as interpreters had no choice but to closely follow the original speech given by the speaker, because it will impose an excessive short-term memory load if interpreters do not start the production process before the end of the sentence. However, this is also risky in terms of the production process, because it will cause a series of production problems at the linguistic level: (1) if the structural and lexical choices are adopted in the target language production, the differences between the languages at both syntactic and grammatical levels could raise difficulties for interpreters, resulting in an unnatural and ungrammatical flow; (2) linguistic interference will occur in a presentation of "grammatical errors, mispronunciations and false cognates, or more discrete interference that will make the interpreter's speech more hesitant, less idiomatic, less clear, less pleasant to listen to"; (3) more linguistic errors will be found if the original speech is interpreted in a semantic way instead of representing its meaning (Gile, 2009a, pp. 164-165).

Short-term Memory Effort (M) operations involve "the lag between the moment speech sounds are heard and the moment they are interpreted" and the interval during which the idea or information, such as "appropriate words and syntactic structures", has to be stored in the memory (Gile, 2009a, pp. 165-166). Interpreters may also wait and use short-term memory to store information before articulating it in the TL when it comes to the conditions that the speech is not clear due to the problems of "logic,

information density, unusual linguistic structures or speaker's accents", or the rendering sequence between the source speech and the target speech is not equivalent (Gile, 2009a, p. 166).

The Coordination Effort (C) means "resources required to coordinate the three other Efforts", namely L, P and M (Gile, 2009a, p. 168).

In order to achieve a smooth performance of SI, two conditions must be met (Gile, 2005, p. 11):

> (1) Firstly, the sum of requirements from the three Efforts (listening and analysis, production, and memory), plus the coordination component, should not exceed the total available processing capacity.
>
> L+P+M+Coordination of Efforts≤Available Resources
>
> (2) Secondly, at every moment, the processing capacity available for each Effort should be sufficient to cope with the task at hand, i.e., comprehension of a particular speech segment, storage and/or retrieval of required pieces of information from the incoming speech, retrieval from long-term memory, and production of the correct lexical units and grammatical structures to express whatever needs to be verbalized at that time in the target speech.

2.4.3.2 Processing capacity-related problems

In the context of the Effort Models, it is certain that problems will appear when the available processing capacity is less than the required processing capacity. In SI, cognitive saturation and failure are due to two aspects: chronic reasons (cognitive skills and declarative knowledge) and occasional reasons (objective factors related to linguistic, semantic and physical features of the source speech; communication environment; interpreter's subjective reasons) (Gile, 2009a, p. 192).

As for cognitive problem triggers that might possibly lead to the appearance of saturation and failure, they can be considered from two perspectives, namely problems caused by an increase in processing capacity requirements, and problems associated with signal vulnerability (Gile, 2009a, pp. 192-194). Many factors could contribute to an increase in processing capacity requirements, such as high density (a high rate of delivery; high density of the information content) of the source speech; external factors (quality of the sound, accents, incorrect grammar, lexical usage, unusual linguistic style and reasoning style); the increase of capacity requirements due to unknown names made up of several words; syntactic differences between source language and target language and low anticipability of the source speech (Gile, 2009a, pp. 192-193). While considering problems in terms of signal vulnerability, these are mainly due to

processing capacity shortages caused by the short duration and low redundancy of the segment, similar consonants, vowels and syllables, numbers, and short names (Gile, 2009a, p. 194).

According to Gile (2009a, pp. 171-172), failure sequences can be exemplified by quality deterioration, an attention deficit that affects the Listening and Analysis Effort, an unexpectedly difficult segment in the source speech that causes the inability of interpreters to finish the task successfully, and insufficient availability of processing capacity for an Effort.

2.4.3.3 Directionality and the Tightrope hypothesis

Language direction has an impact on cognitive processes, with the result of an increase or decrease of memory and attention resources (Padilla, 2005, p. 48). When processing capacity-related problems occur, it is indicated that interpreters may work at the edge of saturation (ibid). Gile (2005, p. 12) proposes that under this circumstances, the analysis of directionality can be taken from the perspectives of comprehension load and production load, namely the amount of processing capacity needed for speech comprehension and speech production respectively, as well as the interactions between comprehension and production.

It is assumed that comprehension and production do not require the same amount of effort when interpreting between A and B language. Gile (2005, p. 13) supposes that production requires more attention and the following two equations show the processing capacity (PC) to be retrieved out of a finite pool of resources in two different interpreting directions:

When working from A into B:

Comprehension + production requirements = 30 (x 60%) + 70 (x 100%) = 88 PC units

When working from B into A:

Comprehension + production requirements = 30 (x 100%) + 70 (x 60%) = 72 PC units

Gile adopts Tanaka's claim that comprehension takes up 30% of PC requirements and production 70% for an illustration purpose of the equation. In terms of Memory Effort and Coordination Effort, he thinks that the PC requirements for these two Efforts have no obvious reason to be A- or B-dependent. According to Gile (2005, p. 13), when working into an A language, both production and comprehension require 40% less PC than into a B language (these proportions are arbitrarily chosen for illustrative

purposes). Therefore, comprehension in the first equation and production in the second equation only require 60% of the PC units.

In contrast to Gile's assumption, Goldman-Eisler (cited in Pöchhacker & Shlesinger, 2002, p. 76) hypothesizes that comprehension needs more processing capacity than production, which occupies 70% instead of 30%. Based on the equation above and provided the proportions are the same, Goldman-Eisler's assumption can be expressed as follows:

When working from A into B:

Comprehension + production requirements = 70 (x 60%) + 30 (x 100%) = 72 PC units

When working from B into A:

Comprehension + production requirements = 70 (x 100%) + 30 (x 60%) = 88 PC units

Still, working into A language requires 40% less PC. Comprehension in A-to-B interpreting and production in B-to-A interpreting occupy 60% of the PC units. However, it should be noted that these two equations are only for demonstration in order to explain the rationale that leads to the conclusion in favour of working into one's A or B language and differences in comprehension and production requirements when working either from A into B or B into A; it is still unknown to what extent it reflects the reality in a practical scenario (Gile, 2005, p. 14).

2.4.3.3.1 Directionality and speech comprehension

It is known that SI is a highly complex cognitive task that involves many dedicated efforts. Unlike comprehension in a monolingual situation, comprehension in SI requires listening to the speech in one language as well as dealing with the interference of producing the target speech in the other language. Therefore, the shared attention between listening and speaking will result in a lack of available efforts. Moreover, when taking the characteristics of a language pair into consideration, directionality will have an impact on the concurrent cognitive processes (Padilla, 2005, p. 51).

According to Padilla (2005, p. 52), compared with comprehension in monolingual situations, the differences that interpreters might be sensitive to in the comprehension of two language directions include: (1) sociolinguistic aspects of language, including the influence on comprehension caused by "the distance or proximity between cultures and their forms"; (2) syntactic structures which affect the comprehension and output of interpreters; (3) grammatical redundancy which "can simplify or complicate the task

of comprehension"; (4) differences in the perception of words, i.e. the length of words, the extent of similarity and familiarity, the value of precision/abstraction and phonetic richness – these differences, which can cause interpreters' attention loss and lexical availability or level of activation, are believed to be one of the most important factors that decides the amount of processing capacities required (Gile, 2005, p. 12); (5) information processing and retention, which means "the deeper the processing level, the greater the level of linguistic and cognitive analysis, and in consequence, the greater the information retention rate"; (6) differences in the comprehension process based on the language combination of either Romance-Romance or Germanic-Romance. For the combination of Germanic-Romance, much effort will be allocated to the analysis of meaning based on the given sentence structures. In consequence, the processing load of memory and attention will be greater and there will be a greater time lag between the source speech and the target speech as the whole structure has to be heard before interpreting. Apart from that, greater effort will be dedicated to syntactic restructuring.

2.4.3.3.2 Directionality and speech production

The factors that affect the speech comprehension will also have an influence on speech production according to the language pairs involved. When it comes to the specific differences in speech production, some of the highlights can be summarised as follows (Padilla, 2005, pp. 53-54): (1) it can be either easier or more difficult to "search for lexical, semantic and referential equivalents during the process of mental conversion" due to the features of language pairs; (2) it may be difficult to make decisions while taking into consideration the structures because of differences in linguistic availability and flexibility, e.g., vocabulary availability, flexibility of lexical use, and syntactic structures; (3) the retrieval of the exact word in the TT is affected by "phonetic and morphological similarities or differences as regards lexis"; (4) syntactic similarities reduce the risk of failure in structural anticipation and decrease the frequency of linguistic errors and that of self-correction; (5) the order of the organization of the information in one language is also important to delivery appropriateness and grammar accuracy. Structural differences between two languages require interpreters to cope with the pressure of overloading short-term memory and "store long segments of information in the memory before verbal production".

2.5 Summary

As discussed in Section 2.4, existing interpreting studies with regard to directionality focus on either theoretical arguments, or empirical studies from the perspectives of interpreting process and production, preference of interpreting direction, and interpreting teaching. A majority of these studies centre on European language pairs. As one of the potential variables in SI, directionality in the language pair of English and Chinese is yet to be extensively researched to date. Also, very few studies examined the impact of directionality on the interpreting process and production from the perspective of paralinguistic features such as filler and repetition and the self-monitoring process. Therefore, investigating the impact of directionality on English<>Chinese SI could provide more insights on the existing processing capacity-related problems in the interpreting process and production and incorporate these into a teaching scenario.

This chapter focused on directionality and its relation to SI by starting with the definition of directionality. Then it discussed the existing literature on directionality from the perspective of written translation and other translational activities. The chapter elaborated on directionality and interpreting in general by analysing in detail the arguments against or in favour of A-B interpreting and empirical studies regarding interpreting direction, as well as the theoretical background of the influence of directionality on SI. In the next chapter, the overall research methods and research design of the current study will be introduced.

Chapter 3 Methodology

This chapter focuses on the research methodology and design, including corpus design, the recruitment of participants and the selection of corpus materials, pilot study, empirical procedures and data analysis.

3.1 Introduction

As mentioned in Chapter 1, there are a number of variables that may influence the performance of SI, which poses a series of challenges to empirical interpreting research. For example, variables such as accent, noise, speed and fatigue need to be considered when selecting the source materials. These variables can be easily manipulated in interpreting experiments as the materials tested could be read by a native speaker at a moderate speed in a noise-free environment. However, to examine the influence of directionality on interpreters' performance in a real-life scenario, as well as build up an "authentic" corpus, the researcher needs to adopt methods that suit the study aim. Bearing these questions in mind, the adopted methods and the design of this research are as follows.

3.2 Investigating directionality - a multi-perspective approach

This study qualitatively and quantitatively assesses the impact of directionality on interpreting procedure and oral outputs. The following sections will discuss further how the collected data were analysed in this study.

3.2.1 Disfluencies and repairs

Fluency studies in linguistics lack consensus regarding definitions which is reflected by disagreement between two terminologies: disfluency and repair. For example, Zayats, Ostendorf and Hajishirzi (2014) include filled pauses, repetitions, repairs and false starts into the category of speech disfluencies, while Postma and Kolk (1990) separate speech disruption into three categories: speech errors, self-repairs and disfluencies. Repairs and disfluencies are synonyms in the true sense as both terms refer to instances of trouble in the linguistic production (Crible, 2017, p. 10). However, repair can be broadly defined as, "instances in which an emerging utterance is stopped in some way and is then aborted, recast, continued, or redone" (Fox, Hayashi, & Jasperson, 1996, p. 189), or be simply referred to as reformulation without having other types of disfluencies being included in a narrow sense (Crible, 2017, p. 10). Therefore, it is necessary to differentiate these two terms before putting forward the

analysis criteria of disfluencies and repairs adopted in this study, since there are some overlaps in categorisation.

3.2.1.1 Speech disfluencies categorisation

Speech disfluencies are generally defined as "phenomena that interrupt the flow of speech and do not add propositional content to an utterance" (Gósy 2007, p. 93). Similarly, Postma and Kolk (1990, p. 292) put it as "interruptions in the forward flow of speech", including "repetitions of (part) syllables, words, and word groups (phrases); prolongations of sounds; blocking on sounds (also including within-word interruptions); and interjections of meaningless sounds". It offers people an insight into the process of speech production. Several scholars have proposed their own classification of speech disfluencies.

Gósy (2004; 2005) proposes two different types of speech disfluencies, namely disfluencies rooted in uncertainty and errors or error-type disfluencies (ETDs). Uncertainty-rooted disfluencies include hesitations, fillers, repetition, restarts, lengthening and pauses within the word. Error-type disfluencies consist of Freudian slips, grammatical errors, contamination, false word activation, "tip of the tongue" (TOT), change, ordering problems and slips.

In Maclay and Osgood's (1959) categorisation, disfluencies such as repetition, false starts and vowel lengthening are counted as filled pauses. Many other scholars have proposed their own versions based on this categorisation. For example, in McNeill's (1979) categorisation, filled pauses, parenthetical sentences and utterance interruptions are considered disfluencies. Magno Caldognetto, De Zordi and Corrà (1982, p. 15) categorise non-fluencies (i.e., fluency interruptions) as follows:

1. unfilled pauses or initial delay which, for the interpreter, correspond to the décalage with the source text;
2. unfilled pauses within the utterance or juncture pauses, such as pauses occurring at grammatical junctures;
3. unfilled pauses within clauses in the utterance;
4. filled pauses, hesitations, such as eeh, mhm, mah, beh, bah (used by Italian speakers), glottal clicks, audible breathings;
5. parenthetical sentences, corrections;
6. utterance interruptions:
   a) repeats, i.e., a word or a phrase is repeated, usually after a pause
   b) restructurings, a sentence is interrupted and rearranged after a pause, with a change in strategy but not in the meaning of the utterance
   c) incomplete sentences or false starts, a sentence is interrupted and remains incomplete since the following one is characterised by a change in meaning.

Similarly, Duez (1982, pp. 13-14) categorised the following non-fluencies, which include:

1. silent pause: any interval of the oscillographic trace where the amplitude is indistinguishable from that of the background noise;
2. filled pause, i.e., the occurrence of hesitation interjections;
3. false start: any sequence of segments that is intended to start the next utterance but is interrupted and replaced by another that will get completed;
4. repeat: any unintended repetition of a sequence of phonetic segments that is subsequently produced in its complete intended form;
5. lengthened syllable.

Tissi (2000) adapts Magno Caldognetto et al.'s classification and divided disfluencies into filled pauses and interruptions. Filled pauses include vocalized hesitations, vowel and consonant lengthening and interruptions consisting of repeats (i.e., repetitions of phrases, whole words or parts of a word), restructuring (i.e., corrections of phonological lapses and of formulation and content errors, as well as structure reformulations), and false starts (i.e., the interruption of an utterance and the formulation of a new one without having completed it).

Based on the available categorisation, Cecot (2001) proposes a new categorisation of non-fluencies, and divides non-fluencies (i.e., fluency interruptions) into unfilled or silent pauses and disfluencies. Silent pauses are further divided into communicative and non-communicative pauses. Communicative pauses include initial décalage, segmentation pauses and rhetorical pauses. Initial décalage serves the function of capturing the attention of the listener at the beginning of the speech and segmentation pauses are used to allow listeners to comprehend the syntactic structure. Rhetorical pauses which can occur within a clause or even between an article and the noun, are not disfluencies but have a role in communication. Table 3-1 provides a detailed categorisation:

Table 3-1 Non-fluencies

<table>
<tr><td colspan="3">Non-fluencies</td></tr>
<tr><td colspan="2">Unfilled or silent pauses</td><td>Disfluencies</td></tr>
<tr><td>Communicative pauses</td><td>Non-communicative pauses</td><td>Filled pauses, glottal clicks, audible breaths, vowel and consonant lengthening</td></tr>
<tr><td>Initial décalage</td><td>Hesitation pauses (non-grammatical pauses)</td><td>Parenthetical sentences</td></tr>
<tr><td>Segmentation pauses</td><td rowspan="2"></td><td rowspan="2">Utterance interruptions:
a. repeat
b. restructuring
c. false start</td></tr>
<tr><td>Rhetorical pauses (grammatical and non-grammatical pauses)</td></tr>
</table>

According to Cecot (2001, p. 71), formal source texts that are read out have the characteristics of communicative rhetorical pauses, while spontaneous speech has more disfluencies, which do not serve as a function of communication. Among the disfluencies mentioned above, it is worth pointing out that vowel and consonant lengthening obviously reflect the difficulties of on-line planning which does not appear in formal source texts. Therefore, by a general comparison of pauses in source texts and target texts produced by interpreters, the pause function can be clearly/easily recognised.

Five indicators of fluency evaluation are examined in Wang's study (2016), which include interruption frequency, hesitation frequency, repetition frequency, correction frequency and blank frequency. The latter two frequencies – correction and blank frequency, have not been analysed in the categorisations mentioned above. Interruption means pauses which include "grammatical pauses (occurring at grammatical junctures) longer than 1.4s and semantic coherence pauses (pauses for message segmentation) longer than 0.56s". Hesitation is defined as "expressions such as 'uh' and 'hun' in SI" and repetitions refer to "repeated usage of words, phrases, and sentences in different linguistic units in SI" (ibid). The definition of correction is "the revision and supplementation of information that is incorrect or omitted", and blank

refers to "the omission of information from the source language to the target language" (ibid). A fair number of studies (e.g., Cecot, 2001; Tissi, 2000; Piccaluga, Nespoulous, & Harmegnies, 2005) give attention to pauses, which is one of the most frequently occurring interruptions in speech.

The categorisations of disfluencies that are used in this study will be further discussed in Section 3.2.2.

3.2.1.2 Categorisation of repairs

Self-repairs refer to when "speakers redirect part of the original utterance to better communicate their intended meaning, or they replace an obvious erroneous element with its appropriate form" (Postma & Kolk, 1990). Levelt (1983, p. 45) put it as: "In order to make a repair, the speaker must, firstly, notice some trouble and interrupt his or her flow of speech, and, secondly, create a new utterance, which takes care of the trouble and its potential consequences for the listener." These definitions indicate that repairs are not only specifically for error correction but also a way to check if the output is appropriate (Petite, 2005, p. 30). Making a self-repair mainly goes through three phases: the monitoring of one's own speech and the detection of the trouble by the interruption of the flow of the speech; hesitation and pausing; making the appropriate repair (Levelt, 1983, p. 41). The following figure shows how repair takes place (Levelt, 1983, p. 45):

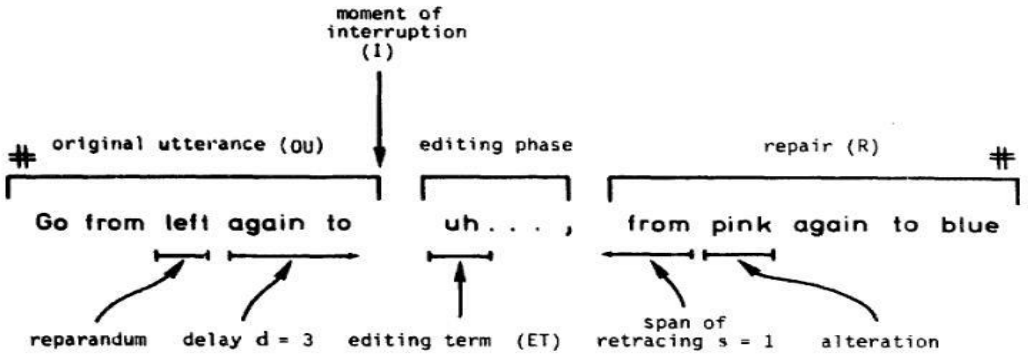

Figure 3-1 The structure of repair

According to Figure 3-1, the original utterance "go from left again to" (OU) contains the reparandum, namely the item to be repaired, "left". Editing term (ET) includes a shorter or longer period of hesitation such as uh, rather, well, etc. Alteration has the word that needs to be repaired. Alternatively, this structure can be simply represented as the following pattern (Zayats, 2014). In this pattern, the interregnum is the same as ET in Levelt's structure and it is optional as well, which is shown as below.

[reparandum + {interregnum} repair]

Levelt (1983) proposes different types of repairs in spontaneous speech by making the distinction between overt (i.e., post-articulatory) repairs and covert (pre-articulatory) repairs. Covert repairs are characterised by either an interruption plus editing of terms or the repeat of one or more lexical items. Overt repairs include A-repairs (appropriateness repairs), E-repairs (error repairs on lexical, syntactic, and phonetic level), D-repairs (different order of words) and a category of repairs called rest category, which do not fit into the first three categories. The following table further explains subcategories of each repair (Levelt, 1983).

Table 3-2 Classification of repairs

Overt repairs (post-articulatory)	Covert repairs (pre-articulatory)	Rest repairs
A: Appropriateness → AA, AL, AC, ALC		
E: Errors → EL, ES, EF		
D: Different		

The subcategories of appropriateness repairs include AA (ambiguity reduction given the context), AL (the use of appropriate level terminology), AC (coherence with previously used terms or expressions), and ALC (where it is impossible to determine unambiguously whether the speaker makes a level-adaptation for a term or establishes coherence). The following examples are provided for a better understanding of the repairs of each subcategory (Levelt, 1983):

Name of repairs	Example
AA-repair	We beginnen in het midden met ..., in het midden van het papier met een blauw rondje We start in the middle with ..., in the middle of the paper with a blue disc
AL-repair	... met een blauw vlakje, een blauw rondje aan de bovenkant with a blue spot, a blue disc at the upper end
AC-repair	Ga je een naar boven, is uh ... kom je bij geel Go you one up, is uh ... come you to yellow
EL-repair	Rechtdoor rood, of sorry, rechtdoor zwart Straight on red, or sorry, straight on black
ES-repair	En zwart ... van zwart naar rechts naar rood And black ... from black to right to red
EF-repair	Een eenheed, eenheid vanuit de gele stip A unut, unit from the yellow dot
D repair	We gaan rechtdoor offe... We komen binnen via rood, gaan dan rechtdoor naar groen We go straight on or... We come in via red, go then straight on to green.
Covert repair	Dan rechtsaf, uh grijs Then right, uh grey

Nevertheless, Levelt (1983, p. 55) admits that "covert repairs are problematic data in that it is almost always impossible to determine what the speaker is monitoring for". Based on the example of covert repair, it clearly does not provide any clue for what the speaker is monitoring for.

Accordingly, Petite (2005) slightly amends the concept and proposes the idea of mid-articulatory repair to replace covert repair for the purpose of SI data, because in some cases, the utterance has already been partly articulated before being repaired. Mid-articulatory repairs, i.e., within-word interruptions, refer to the situation that "the interpreter uttered parts of the word before stopping in mid-flow, going back and repairing" (Petite, 2005, p. 221). For instance:

Example 3.1:

ces op-possibilités
these opp-possibilities

In this example, the interpreter probably wanted to express the word "opportunity" and s/he uttered the part of the word "opp-", stopped in the mid-flow and continued saying "possibilities" to finish the chunk.

However, Kormos (1999) argues that Levelt's (1989) perceptual loop theory of monitoring seems to be the model that is more suitable to error detection in L1 speech production since certain types of errors do not tend to be detected by L2 speakers even though they have the linguistic knowledge. According to Kormos (1999, p. 313), two main factors, i.e., available attention by individuals and the demands of the task, influence the allocation of attention in L2 processing. Therefore, Levelt's (1989) system of classification is further expanded to form a taxonomy of L2 self-corrections. For example, Brédart (1991) proposes a fourth category of appropriateness repairs, namely, repair for good, which means to replace an utterance or part of an utterance either due to the reason that it is not in line with the perceived canonical rules of "good language" or because it is not socially appropriate. For error repairs, Kormos (1999, p. 17) argues that Levelt's definitions of each category of error repairs are not accurate enough, making it difficult to distinguish lexical error repairs from syntactic error repairs. Besides, due to the limited L2 competence, it is also difficult to determine if it is a repair of erroneous or inappropriate syntax or tense, or if it is a reconstruction of

the sentence. Accordingly, Kormos (1999) proposes that different repairs should be further divided into ordering error repairs (example 3.2), inappropriate information repairs (example 3.3) and message replacement repair (example 3.4), which means the speaker completely gives up the originally intended message. The following examples further illustrate these repairs.

Example 3.2:

Uhm well there's a big dining table for forty person. And then we've also got er well it's well the dining table occupies half of the room.
Retrospection: I thought, I did not tell you first how big the room was, so I said that the dining table occupies half of the room, and then I said what I originally wanted to say.
(Kormos, 1998, p. 54)

Example 3.3:

you have to we have to make a contract
Retrospection: I realized that it is stupid to say that you have to make a contract; it's the restaurant who has to write it.
(Kormos, 1998, p. 54)

Example 3.4:

we have some er er v—maybe you have vegetarians in your group
Retrospection: Here the idea of vegetarians suddenly popped up, and I abandoned what I was going to say because I would not have been able to list any more types of food anyway.
(Kormos, 1998, p. 55)

Example 3.5:

It doesn't it's not a problem
Retrospection: First I wanted to say "it does not matter," but I realized that in a business deal you cannot say "it does not matter."
(Kormos, 1998, p. 57)

Example 3.6:

thirty-five per people

Retrospection: First I wanted to say “persons,” but I had used “persons” several times before, so I said “people.”

(Kormos, 1998, p. 58)

As for appropriateness repairs, repair for good language is further divided into pragmatic appropriacy repairs (Example 3.5) and repairs for good language (Example 3.6).

3.2.2 Analysis criteria of disfluencies

As discussed in the previous sections, there is an overlap in the categorisation between disfluencies and repairs. For instance, disfluencies such as filler sounds or filler words appear as an optional interregnum in repairs in Levelt’s classification. Moreover, restructuring or false starts can also be compatible with a category of self-repairs in Levelt’s framework. It seems that disfluencies could be incorporated into self-repairs according to the relevant concepts. However, as mentioned earlier, covert repairs such as filled pauses and repetition of part of the utterance may be difficult to explain from the perspective of self-monitoring in terms of the monitoring content, as they are represented by an interruption plus editing term or the repeat of one or more lexical items. What is more, according to Postma and Kolk (1990), a considerable difference between disfluencies and self-repairs is that self-repairs always involve change or correction, but disfluencies are more likely to be the by-product of covert repairs. Taking all this into account, this study completely separates the category of disfluencies from that of self-repairs.

3.2.2.1 Analysis criteria of filled pauses

After making a distinction between disfluencies and self-repairs, the next question regards the specific categories that this study uses to address the research questions. It should also be noted that the proposed categories that are available in the existing theoretical framework may not be completely reflected in the actual SI data. The categorisations listed in Sections 3.2.1.1 and 3.2.1.2 are based on speech. However, speaking a language and interpretation are not entirely the same. Taking SI as an example, as discussed in Section 1.2, the cognitive processes of interpretation involve comprehension of the ST, simultaneity, variable controls and so on. Therefore,

interpretation does not only require interpreters to speak a language but also needs interpreters to transmit the message delivered in the ST.

For the analysis criteria adopted for disfluencies and self-repairs, this study takes the available categorisation of speech disfluencies mentioned in Sections 3.2.1.1 and 3.2.1.2 as a reference and particularly draws upon the categories adopted in previous interpreting studies on disfluencies and/or self-repairs in different language pairs (e.g., Bóna & Bakti, 2020; Guo, 2018; Petite, 2005; Yuan & Wan, 2019). Accordingly, given the differences between English and Chinese in particular, the study proposes a set of analysis criteria that are adapted and used specifically for the purposes of this study.

Regarding disfluencies, the corpora of target texts produced by both students and professional interpreters are analysed from two aspects of disfluencies, namely filled pauses and repetition. Unfilled pauses, also known as silent pauses, are not included in the assessment in this study. The reasons for unfilled pauses are various. It could happen in one of the processes of an interpreting loop, such as waiting for the incoming information or considering the current organization of information, and it is not easy to clearly distinguish one from the other without the analysis of EVS (Oléron & Nanpon, 2002, p. 46). The analysis of the unfilled pauses requires simultaneous recording of both ST and TT so that reasons for unfilled pauses can be better identified. However, due to the constraints of the experimental environment in this study, all the interpretations are recorded in a single track. Due to these reasons, this study excludes the analysis of this indicator. Other disfluency indicators, such as false start and restructuring, are incorporated into the category of self-repairs. For the purposes of the current study, they are not included in discussion to avoid repetition. Table 3-3 shows the types of filled pauses with definition and examples in details (Bóna & Bakti, 2020; Guo, 2018).

Table 3-3 Types of filled pauses

Filler types	Definition	Examples
Filler sounds	any sound or syllable which does not contribute to the meaning of the sentence	English filler sounds: um, uh Chinese filler sounds (with pinyin in bracket): 嗯 (en), 啊 (a), 呃 (e)
Filler words	any extraneous word which does not contribute to the meaning of the sentence	English filler words: well, like, you know Chinese filler words (with pinyin in bracket): 这个 (zhège), 那个 (nàge or sometimes pronounced as nèige)

In the definition of filled pauses, it is worth pointing out that it involves differenciating the concept of syllable and word between the Chinese and English languages. Consequently, this brings the question of what should be counted as a word in Chinese because Chinese tends to be monosyllabic while English words can be either mono or polysyllabic. In fact, Chinese scholars have long explored the basic equivalence unit of word in Chinese. For instance, according to Zhao (1992), Chinese is not a language counted by word. In Chinese people's minds, character is the theme of the topic. Both Xu (1997) and Pan (2002) explicitly state that the basic unit in Chinese is sinogram, i.e., character, while word is the equivalent unit in Indo-European languages such as English. Ross and Ma's (2006) explanation might bring a clearer answer to this question. Each syllable in Chinese is associated with a Chinese character as well as a meaning (Ross & Ma, 2006, p. 6). For example, '学 (xué)' is a syllable with the meaning of study and it can be combined with other syllables to form words such as '学生 (xuésheng)', which means student (Ross & Ma, 2006, p. 7). However, the word 'lettuce' in English has two syllables, which are 'let' and 'tuce', and neither of these two syllables have meaning in this word (Ross & Ma, 2006. p. 6). But not all Chinese words are made of multiple syllables, one syllable can also be a word, such

as ‘不 (bù)’ which can be used to indicate the meaning of no. Therefore, when deciding if a Chinese character is a word or not, its use needs to be analysed within the context of interpretation texts. At the same time, a Chinese word parser tool[7] developed by China’s Ministry of Education Institute of Applied Linguistics is used to help with the parsing of word.

In terms of filler words, ‘这个 (zhège)’ and ‘那个(nàge)’ in English mean this/this one and that/that one respectively. But they can be used as a filler in Chinese, which has the same function as ‘well’ in English. Under strict cognitive constraints, interpreters may use fillers to hide effort, hesitation or silence (Cheung & Ma, 2020, p.443). It should be noted that ‘那个 (nàge)’ is sometimes briefly uttered as ‘那 (that)’ in spoken Chinese as a filler word. However, it should also be noted that ‘这个 (zhège)’ and ‘那个 (nàge)’ do not always count as filler words. Therefore, they need to be analysed depending on the meaning in the context. Examples 3.11 and 3.12 further illustrate this point.

Example 3.11 (Ross & Ma, 2006, p. 46):

nàge	xuéxiào
那个	学校
that	school

In example 3.11, ‘那个 (that or that one)’ is part of the noun phrase, which means ‘that’. Therefore, it cannot be counted as a filler word in Chinese as it denotes the meaning in this context.

Example 3.12:

ST:	...many women...			
	hěnduō	de	zhège	nǚxìng
SI:	很多	的	[这个]	女性
Gloss:	many	(particle)	[well]	women

[7] It is a free online parsing tool that can provide corpus analysis in Chinese, including parsing words, romanization and word frequency analysis.
Available at: http://corpus.zhonghuayuwen.org/CpsWParser.aspx

In example 3.12, the ST is extracted from the English speech material used in the experiment and the SI is the transcription of the interpreted texts provided by one of the participants in this study. Gloss translation is produced by the researcher. This is a typical example where '这个 (zhège)' in the noun phrase is marked as a filler word. Firstly, the word 'women' refers to a group of people instead of an individual; '这个 (zhège)', as mentioned above, means this or this one. According to the Chinese grammar, it is not correct to add '这个 (zhège)' in front of the word 'women' since it is a plural form but '这个 (zhège)' is a single form. Secondly, '很多的 (hěnduō de)' and '这个 (zhège)' cannot be in collocation with each other. '很多的' is an adjective, which can be used as a modifier in front of a noun, which is 'women' in this phrase. The basic structure is 'modifier + de + head noun' (Ross & Ma, 2006, p. 50). However, '这个(zhège)' is a pronoun and it cannot appear together with a head noun based on this structure. Therefore, '这个 (zhège)' in this phrase is a filler word. In short, the way to determine if '这个 (zhège)' is a filler should be based on its redundancy and whether the original meaning is distorted after deletion (Cheung & Ma, 2020, p. 443).

Qualitative analyses on triggers for filled pauses in this study will be provided based on the observation of the corpora, as well as the retrospective interviews with participants. As mentioned in Section 1.2.2.1, silent pauses in the ST could be used by interpreters as a strategy or taken as a buffer to cope with the challenge caused by simultaneity. In comparison, unnatural pauses (filled pauses and long silent pauses) in the TT might largely reflect cognitive problems in the task. As mentioned in Section 2.4.3.2, the common cognitive problem triggers include: an increase in processing capacity requirements (e.g., high density; syntactic differences; low anticipability of the source speech) and signal vulnerability (e.g., processing capacity shortage, low redundancy of the segment, similar consonants, vowels and syllables, numbers, and short names) (Gile, 2009a). With regard to triggers for filled pauses in interpreting, the causes of filled pauses for CI summarised by He (2007, pp. 17-18) include:

1) high density of the speech;
2) unknown names composed of several words, technical terms, or names whose whole target-language version is unknown to the interpreter;
3) syntactic difference between the ST and the TT, which causes interpreters to store a large amount of information for some time before being able to reformulate it in the TT;

4) external factors such as noise, strong accent or poor English on the part of the speaker;
5) idiosyncrasies of the interpreter, which means filled pauses become a part of interpreters' habitual use and they barely realize it as a problem.

Wang's typology (2015) on triggers for filled and silent pauses in SI include: (1) pauses caused by difficulties with certain effort(s) of cognitive processing SI such as conceptualising, formulating and monitoring; and (2) pauses in relation to SI-specific strategies such as waiting, restructuring, etc.

The categorisation of triggers of pauses adopted in this study is developed on the basis of the aforementioned categorisations. In order to fit the features of the corpora, some adaptations are made:

1) conceptualising: filled pauses due to difficulties in listening comprehension and logic analysis of the ST;
2) information density: high density of information of the ST;
3) formulating: filled pauses due to searching for certain expressions or optimising the usage;
4) syntactic difference: filled pauses due to the 'headword' after a long modifier or a meaning unit caused by grammatical differences between English and Chinese;
5) idiosyncrasies: filled pauses due to interpreters' personal language behaviours.

By observing the corpora used in the current study, the researcher has found that filled pauses also exist in repetition and repairs. Given the fact that repetition (see Section 3.2.2.2) and self-repairs (see Section 3.2.3) are also included in the research scope of this study, any filled pauses occurring in repetition and repairs will be discussed in their specific sections.

3.2.2.2 Analysis criteria of repetitions

Repetition is another type of disfluency that is analysed in this study. The purpose is to determine if there are any differences in the proportion of repetition types in English to Chinese and Chinese to English interpreting directions, as well as to find out if there are any particular reasons for causing repetitions. Table 3-4 elaborates the subcategory of repetition types with definition and examples for each type in English and Chinese (Bóna & Bakti, 2020; Guo, 2018).

Table 3-4 Types of repetition

Repetition types	Definition	Examples
Part-word repetition	A sound or syllable pronounced more than once with no additional meaning	English: The mother is in the k-k-kitchen Chinese: 他们明确阐-阐明了立场 (They sta-state a clear position)
Whole-word repetition	A word produced more than once with no additional meaning	English: Give me the the book, please Chinese: 泰国泰国 (Thailand Thailand)
Phrase repetition	More than one word produced more than once with no additional meaning	English: I think I think it was nice Chinese: 为什么您为什么您认为... (Why do you why do you think...)

In this study, any repetition that appears in the transcribed text will be put into the relevant category based on Table 3-4. When exploring the corpora used in the current, the researcher has also found some exceptional cases.

Example 3.13:

ST: ...women...

SI: ...f-[嗯]妇女...

pinyin: ...f-[en]fùnǚ...

Gloss: ...w-[um]women...

In example 3.13, the consonant ‘f’ was repeated twice. The first syllable/character was not fully articulated, and a filler was inserted. However, according to the part-word definition, the sound ‘f’ was repeated twice. So the researcher has decided to put cases like this into the category of part-word repetition.

Example 3.14:

ST: 我们要...

Gloss: We need

TT: We need to...

SI: We need to [em] to...

The preposition word ‘to’ was repeated twice. Compared with example 3.13, the word was fully uttered. Though it has a filler in between the repetition, it conforms to the definition of whole-word repetition. Therefore it is categorised into whole-word repetition accordingly.

In addition, the phenomenon of a consecutive articulation of synonyms exists. For example, one of the interpreters articulated ‘and as well as’ in Chinese to English interpretation. As ‘and’ and ‘as well as’ are synonyms but there are very few cases in the corpora, this case is counted as repetition instead of setting up a new category.

3.2.3 Analysis criteria of self-repairs

As for the analysis of repairs, the criteria focus on the English and Chinese interpretations generated by both groups of interpreters from the perspectives of post-articulatory repairs, mid-articulatory repairs and repair failure.

Post-articulatory repairs include (see, e.g., Kormos, 1998; Levelt, 1983; Petite, 2005): (1) different repairs: the speaker may realise that another arrangement of messages would be easier or more effective; (2) error repairs: a speaker may discover that what s/he is saying contains an error of some sort and this includes lexical error and phonetic error (mispronunciation); (3) appropriateness repairs: intended information needs qualification in view of the context of expression. Mid-articulatory repairs refer to within-word repairs (Petite, 2005). The category of repair failures is introduced based on the exploration of the corpora in this study and is characterised by attempted repairs that fail to achieve the aim. Examples below are extracted from the corpora for further explanation of each category. SIs are from the participants and gloss, BT and TT are provided by the researcher.

Example 3.17:

ST: ...encouraging more women to pursue careers...
SI: ...让女性追逐于她们获得工作上的成保成就...
Gloss: ...let women pursue them obtain career up (particle) chéngbǎo achievement...
BT: ...let women pursue them obtain the achievements on careers...

Example 3.17 shows two repairs. The first repair occurred at the beginning of the chunk as the interpreter changed the manner of expression. At first, the interpreter wanted to follow the sequence of the ST but realized that she might not be able to finish the sentence in an appropriate way. Instead, she stopped the flow after the word 'pursue', replaced 'women pursue' with them and continued the articulation. The second repair is error repair in phonetics. The interpreter wanted to say '成就 (chéngjiù)', which means achievement while accidentally pronounced it as chéngbǎo. The interpreter then immediately repaired into the correct pronunciation.

Example 3.18:

ST: Women and men could see what needed to be done...
SI: 男女可以需要可以看到需要做什么做什么...
Gloss: men women could need could see need do what do what
BT: Men and women could need could see what needed what needed to be done

This is an example of appropriateness repair for providing a more precise interpretation as well as improving idiomaticity of the TT. The interpreter started repairing after the articulation of '可以需要 (could need)' though the articulation could be completed with '做什么 (do what)' and the meaning can be understood in Chinese. However, '可以 (could)' is rarely in collation with '需要 (need)'. The interpreter changed the expression by providing a more precise interpretation based on the original ST, adding '看到 (see)' in the sentence. By doing so, '需要 (need)' can be naturally combined with '做什么 (do what)' to continue the flow.

Example 3.19:

ST: ...第一份妇女权利宣言诞生...

Gloss: ...the first women rights declaration birth...

TT: ...the first publication of the Declaration of the Rights of Woman...

SI: ...the publication of Decs- Declaration of Rights on Women...

The interpreter adopted a mid-articulatory repair at phonetic level in the interpretation. The word was pronounced as 'decs' at the beginning, however, without finishing the utterance, the interpreter realized the pronunciation was wrong and immediately changed it to the correct one in the middle of the flow. The potential reason for causing the repair is due to the fact that the word 'declaration' consists of several syllables and this word might be stored in the interpreter's knowledge but could not be retrieved actively or immediately with the correct pronunciation.

Example 3.20:

ST: And it is an honour, as I look across this hall to see so many leaders from business, diplomacy, government, civil society, a real gathering of those who share this commitment.

SI: 我很荣幸在在这里看到许-来自各国的领导相聚如此

Gloss: I very honoured in in here see ma-from different countries leaders join such

BT: I'm very honoured to see ma-leaders from different countries join such in in this place

This example shows repair failure. In the ST, the prepositional phrase with a list of nouns posed a challenge to the interpreter. At the beginning, the interpreter might have wanted to use 'many' but stopped in the middle of the flow and changed it to 'leaders from different countries'. This might be because the interpreter noticed the prepositional phrase, but given the short time, s/he could not retrieve the equivalent expression of each noun but instead omitted the original information and provided a general expression, which is 'from different countries'. However, compared with the ST, the repair did not meet the aim. Consequently, it is categorised as repair failure.

It should be pointed out that SI is a complex action. Based on the intrinsic features of the data collected, sometimes the specific subcategory of a repair, such as the use

of appropriate level terminology or ambiguity deduction in appropriate repairs, might not be reflected in the corpora. Therefore, the researcher decided to put all these repairs into a general category based on the above, then provide specific subcategories of each type of repairs based on the reasons and motivation of repairs for each interpreting direction between two groups in the qualitative analysis (see Chapter 5).

3.2.4 Annotation check

All the classification of disfluencies and self-repairs are annotated by the researcher in the transcription files in a comment form. To minimize the subjectivity in the annotation of classification, all annotations were double checked by a linguist checker, based on the detailed classification of disfluencies and self-repairs. Before the annotation checking, the researcher provided the classification to the checker and went through one copy of annotation in the English to Chinese direction and one copy from the other direction together. This was to make sure that the external checker was familiar with the classification. When the checker finished the process, the researcher examined all the discrepancies to see if there was agreement between the researcher and the checker. If disagreements remained, the researcher consulted the supervision team (one of whom is a native Chinese speaker) for further advice.

3.3 Research methods

3.3.1 Quantitative and qualitative methods

Gile's (1998, pp. 69-70) classification of observational and experimental approaches is frequently used in interpreting studies. Observational research refers to "studying a phenomenon as it occurs, 'naturally', as it was, 'in the field'"; on the contrary, experimental research "makes a phenomenon occur precisely for the purpose of studying it" (ibid). In other words, the data of observational research are there for the taking, while experimental data are collected by the researcher under controlled conditions informed by the aim of the experiment.

However, Pöchhacker (2004, p. 63) points out that the survey approach, by way of interviews or questionnaires, is not widely used in interpreting studies. Also, the observational-vs-experimental dichotomy makes it ambiguous in terms of "observation as an overall research approach and a particular method of data collection" (Pöchhacker, 2004, p. 63). That is to say, methods of data collection in interpreting studies may include "observation of subjects, focus groups, interviewing, cued retrospection and analysis of recordings", and this makes it clear that research

strategies may consist of fieldwork, survey and experimental research (Pöchhacker, 2004, p. 63). According to Pöchhacker (2002, pp. 62-63), in order to achieve the purpose of a study, a general methodological strategy should be adopted in the research, and specific research strategies can be tailored to a particular field of study.

The overarching aim of this research is to investigate the impact of directionality on the English<>Chinese SI performance of student and professional interpreters.

The general question proposed in this research is whether directionality influences the SI performance of both student and professional interpreters. If the answer to the general question is affirmative, three related research questions are:

(1) To what extent and in what ways does directionality impact the disfluency frequency in SI?

(2) To what extent and in what ways does directionality impact the repair frequency in SI?

(3) To what extent does the performance of interpreters in two groups differ under the impact of directionality?

Considering these three research questions, the proposed hypotheses are:

(1) If directionality has an impact on the SI disfluency frequency (i.e., filler frequency and repetition frequency) for both student and professional interpreters, then disfluency frequency in Chinese to English SI will be higher than that in English to Chinese SI for both groups;

(2) If directionality has an impact on repair frequency for both student and professional interpreters, then repair frequency in Chinese to English SI will be higher than that in English to Chinese SI for both groups;

(3) If directionality has an impact on the performance of both student and professional interpreters in two directions, then given the expertise level, professional interpreters will have less disfluency frequency and repair frequency than student interpreters in both directions.

The null hypotheses are that there would be no differences in disfluency and repair frequency for either groups in both directions and in performance between two groups in both directions.

To verify these hypotheses, both qualitative and quantitative methods are used. In general, for qualitative methods, "interviews and discussion are the key approaches for information-gathering, mostly in the form of audiotaped recordings, observations,

documentary analysis and/or field notes" (Regmi, Naidoo, & Pilkington, 2010, pp. 17-18). Quantitative methods refer to "objective measurements and the statistical, mathematical, or numerical analysis of data collected through polls, questionnaires, and surveys, or by manipulating pre-existing statistical data using computational techniques" (ibid). In this study, questionnaire surveys, structured observations and interviews are used for data collection. Corpus-based quantitative approaches and qualitative approaches are used for data analysis.

Given the research gaps and the hypotheses mentioned earlier, this research investigates the disfluencies (see Section 3.2.1.1) and the repairs (see Section 3.2.2.2) in the interpreting process generated by both groups in English to Chinese SI and vice versa by means of corpus analysis, and also compares the performance differences between the two groups. To answer the first question, an intra-group comparison (within student/professional group) is made to identify the impact of directionality on disfluencies made by each group of interpreters, as well as the relevant proportion of each type of disfluencies in each direction. To answer the second question, the same method adopted in answering the first question is used to analyse the impact of directionality on repair frequency and the proportion of each category of repairs. In terms of the third question, an inter-group comparison is adopted to present the differences between the student group and the professional group in the frequency of disfluencies and repairs and its relevant proportion. Furthermore, qualitative analysis of interpretations in both directions explain various reasons that trigger disfluencies and repairs. Retrospective interviews are analysed to provide qualitative evidence to better understand the influence of directionality on SI performance.

3.3.2 Interpreting corpus

This section further discusses the interpreting corpus, a research method used in interpreting studies, as well as the corpus designed for this research.

3.3.2.1 Corpus-based interpreting studies

Corpus is usually defined as "a large collection of authentic texts that have been gathered in electronic form according to a specific set of criteria" (Bowker & Pearson, 2002, p. 9). In other words, a corpus is "a collection of [...] machine-readable [...] texts" (McEnery, McEnery, Xiao, & Tono, 2006, pp. 4-5). In interpreting studies, Setton (2011, p. 38) explains it as authentic corpora, which is the empirical data from real-life interpreting assignments (not anecdotes, introspection, or experiments). However,

according to Russo, Bendazzoli and Defrancq (2018, p. 4), there are still ad hoc interpreting corpora created by individual researchers for manual analysis, which provides a complement to the field of corpus-based interpreting studies (CIS). So, an authentic interpreting corpus refers to "a collection of spoken texts and interpreting that is neither machine-readable nor mechanically analysed; the text collection satisfies the rest of corpus criteria, however, i.e., 'authenticity' and 'representativity of a specific language variety'" (McEnery et al., 2006, pp. 4-5). Therefore, from the way corpora are built, they can be generally divided into three broad categories: manual corpora (not readily suitable for automatic extraction of occurrences), early machine-readable corpora, and fully machine-readable corpora (available to the scientific community) (Bendazzoli & Sandrelli, 2009).

Compared with the use of corpus in research in translation studies, the use of corpus in interpreting studies is restricted because of difficulties around gathering, transcribing and making spoken and sign-language data available in electronic form (Metzger & Roy, 2011; Niemants, 2012), which can largely influence the corpus size used in interpreting studies. Based on the available literature (Tohyama, Matsubara, Ryu, Kawaguch, & Inagaki, 2004), the Simultaneous Interpretation Database of Nagoya University is believed to be the only interpreting corpus that contains one million words, with a total of 182 hours of voice recordings of both English-Japanese and Japanese-English SI, the size of which is incomparable to the reference corpus such as the British National Corpus (Love, Dembry, Hardie, Brezina, & McEnery, 2017) which has millions of words on record.

Despite the limitations mentioned above, CIS as a research paradigm has received much attention in the last twenty years and it is believed that more studies shall be made to expand interpreting corpora and validate interpreting hypotheses on larger datasets (Russo et al., 2018, p. xii).

3.3.2.2 Corpus in interpreting research

According to the current literature, several language combinations are covered in CIS projects. Among European languages, some existing machine-readable corpora include European Parliament Interpreting Corpus (EPIC), European Parliament Interpreting Corpus Ghent (EPICG), Translation and Interpreting Corpus (TIC), Interpretación de la Metáfora Entre ITaliano y ESpañol (IMITES) Corpus, EUDEB14 Corpus as a sub corpus of CorIT, and Football in Europe (FOOTIE) Corpus. The

languages covered in these corpora include English, Spanish, Italian, French, Dutch and German. Accordingly, a series of studies have been carried out based on these corpora. For example, studies (e.g., Bendazzoli et al., 2004; Bendazzoli & Sandrelli, 2005; Monti, Bendazzoli, Sandrelli, & Russo, 2005) focusing on directionality in SI are carried out based on European Parliament Interpreting Corpus (EPIC), which is an electronic, parallel, and multilingual (English, Italian and Spanish) corpus. The corpus is made up of original speeches in each language direction and the two corresponding interpretations for each original speech, namely: (1) the corpus of the original English speech and its Italian and Spanish interpretation; (2) the corpus of the original Italian speech and its English and Spanish interpretation; (3) the corpus of the original Spanish speech and its Italian and English interpretation. The project aims to explore recurrent lexical patterns and morpho-syntactical structures, as well as to investigate the use of different strategies when interpreting from English into Italian and from English into Spanish and vice versa or interpreting between Italian and Spanish. In later research conducted by Bendazzoli, Sandrelli and Russo (2011), they particularly explore the two types of disfluencies in spoken language – mispronounced words and truncated (unfinished words) – by using the same corpus, and two hypotheses are tested. For the first hypothesis, the results showed simultaneous interpreters produced more disfluencies than SL speakers but there were two exceptions. Compared with interpreting between two Romance languages, interpreters produced a lower percentage of mispronounced and truncated words when interpreting from a Romance into a Germanic language. Also, a higher percentage of disfluencies (both mispronounced and truncated words) was found in interpreted speeches than in SL speeches addressed in the same language. For the second hypothesis which is interpreters were unlikely to repair disfluencies due to constraints in SI task, it showed that neither SL speakers nor interpreters corrected mispronounced words regardless of language directions, but truncated words were completed by both SL speakers and interpreters even though SL speakers did more completion.

For some other European languages, there also exist manually analysed corpora built for the purpose of specific research. For instance, for the English-Polish language pair, Gumul (2006) built a corpus of two authentic recorded speeches and each speech is interpreted by 14 advanced interpreting students who had Polish as their native language and English as language B. The aim was to investigate the use of explicitation

in SI. Liontou (2011) compiled a small bilingual spoken corpus which consists of two sub-corpora with a purpose of studying strategies in German to Greek SI. The first corpus was made up of three original German speeches addressed at the plenary sessions of the EU with a duration of approximately 5 mins for each speech, and the second corpus was their respective simultaneous Greek interpretations.

In non-European languages, there are a limited number of corpora in Japanese and Chinese. Apart from the corpus built by Nagoya University mentioned earlier, another available SI corpus for the language pair of Japanese and English has a total of 387k words of transcribed data (Shimizu, Neubig, Sakti, Toda, & Nakamura, 2014). According to Shimizu et al. (2014, p. 670), the two distinctive features of this corpus are that: (1) the data was collected from three interpreters with different amounts of experience, namely 15 years, 4 years and 1 year; (2) interpretations were compared with translation data (i.e., subtitles). In the English-Chinese language pair, Wang (2009, 2012) built a corpus of Chinese-English Interpreting for Premier Press Conferences (CEIPPC). In later research, Wang and Zou (2018) extended the corpus to a total size of 219,116 words with the aim of investigating language specificity as a variable in Chinese-English interpreting. Finally, Wang (2008) compiled a corpus to investigate the compression strategy in Cantonese-English SI, consisting of authentic spoken data from recordings of professional simultaneous interpreters' performance in the Hong Kong Legislative Council meetings, and three meetings, which were all question-and-answer sessions, were chosen for data analysis.

3.3.2.3 Corpus in the current research

In the current study a corpus is specifically built with the purpose of addressing the research questions proposed. The corpus (see Figure 3-2) consists of two sub corpora: one is the English original speech with two Chinese interpretation versions by 10 professional interpreters and 10 student interpreters, the other one is Chinese original speech with two English interpretation versions by the same group of professional interpreters and student interpreters.

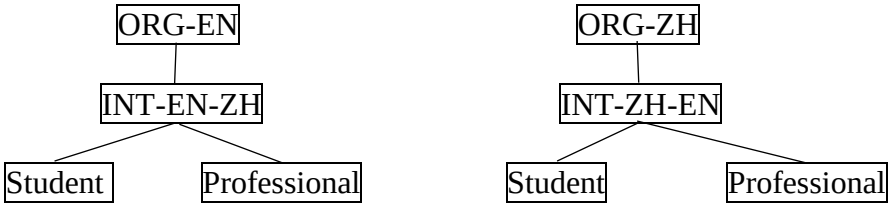

Figure 3-2 Corpus structure

(ORG = original speech, i.e., source text; INT = interpreted speech, i.e., target text; EN = English; ZH = Chinese; Student=Student interpreters; Professional=Professional interpreters)

3.4 Research design

3.4.1 Expert-novice paradigm

According to Moser-Mercer, Frauenfelder, Casado and Künzli (2000, p. 108), an expert is defined as "someone who has attained a high level of performance in a given domain as a result of years of experience" and a novice refers to "someone who [has] little or no experience in a particular domain". The expert-novice paradigm, to put it simply, is an approach used in interpreting research to contrast novices with experts. This paradigm can provide "insights into the skills and skill levels needed to become an accomplished expert" as well as "important insights into cognitive adaptability, brain plasticity and general capacity, and create synergies with the field of performance psychology" (Moser-Mercer, 2015, p. 155).

A wide range of topics have been covered by studies using the expert-novice paradigm. Dillinger (1994), Bajo et al. (2000) and Yudes et al. (2013) all explored the issue of comprehension. Some studies focus on memory and bilingual processing skills (e.g., Chincotta & Underwood, 1998; Christoffels et al., 2006; Darò & Fabbro, 1994), working memory performance (Liu et al., 2004; Tzou et al., 2012) and stress (Kurz, 2003). Some studies only targeted professional practitioners and students. For instance, Dillinger's (1994) study only involved eight professional conference interpreters and eight bilingual graduate students. Other studies target other categories of participants as well. For example, there were four groups of participants in Bajo et al.'s (2000) research: ten practitioners who either passed the final interpretation exam from University of Granada or had about five years' interpreting experience; eight bilinguals; ten students who were in their second year of an interpreting programme and ten non-interpreters from other fields. Similarly, Yudes et al. (2013) had four groups of participants: professionals, monolinguals, bilinguals and interpreting students. However, it should be noted that the level of expertise for professional practitioners in

these studies is not stated very clearly. Therefore, it is also the fact that the reliability of many existing studies is compromised due to the definition of levels of expertise, which brings difficulties to replicating the study with the aim of validating the results.

In this current research, the expert-novice paradigm is adopted, which means both student interpreters and professional interpreters are included in the main study. The demographic information of the main study participants, including language ability, training length, and level of expertise, will be explained in Section 3.4.3.1. In the pilot study, professional interpreters were not invited and the reasons will be further discussed in Section 3.4.3.1, too.

3.4.2 Research ethics

Before conducting this research, approval was granted from the Swansea University Research Ethics Committee. An information sheet was sent to all the potential participants who showed interest in the research beforehand, which explained the purpose of the study, the researcher of the study, experiment procedure, data collection, data protection and confidentiality, participation remuneration and withdrawal rights. On the day of the experiment, the researcher confirmed the participants' understanding and willingness to participate in the study. Signed consent forms were obtained from all participants in both the pilot study and main study.

3.4.3 Pre-experiment questionnaire for interpreters

Participants were given a questionnaire (see Appendix I and II) prior to the experiment. The purpose was to determine the profile of the participants by age, gender, education background, interpreting training background, language combination, work experience, level of expertise as well as preference towards directionality.

3.4.3.1 Participants' demographics

A total number of twenty interpreters participated in this research. All the participants are native Chinese speakers and have English as both their second language and working language. As mentioned earlier, one of the research questions is to investigate the impact of level of expertise on the performance of SI from the perspective of directionality - both professional and student interpreters are participants in this research. The table below presents the demographic information of the participants.

Table 3-5 Basic information about participants

Participants	Student interpreters	Professional interpreters
Number of participants	10	10
Age group	18-24 years old	25-34 years old
Gender	2 male, 8 female	1 male, 9 female
Average years of learning English	13.3	15.5
Average years of using English as a working purpose	3 months	4
Average years of working as a professional interpreter	No prior experience	3.5

At the time of testing, the ten student participants were studying an MA in Translation and Interpreting at different universities in the UK and had received at least two to three months of SI training before participating in this research. Their average overall IELTS score was 7.5. They had very little interpreting experience.

The other ten participants are professional interpreters. Based on some of the available studies that have been undertaken with professional interpreters (e.g. Mead, 2002; Wang, 2014), interpreters with at least five to ten years' work experience are preferred. However, recruiting professional interpreters with this level of experience turned out to be very difficult in practice. As Wang (2014, p. 133) mentions, the expense of having very experienced interpreters can be very high, which makes it a difficult option given the limited research allowance for a PhD study. Apart from this, it is difficult to adjust such interpreters' busy schedule to fit the research plan, and experienced interpreters who have already gained their fame in this field tend to be reluctant to have their interpretation recorded, as they feel they will be assessed and judged. Similar challenges have also been attested in other interpreting studies (e.g., Gile, 1997; Wang, 2014), and it has been shown that having less experienced interpreters (e.g., one year's experience) is also acceptable (Mead, 2002). Therefore, the researcher decided to recruit professional interpreters who had one to five years' interpreting experience after graduation. As shown in Table 3-5, the professional

interpreters had worked an average of 3.5 years at the time of testing. Based on their report of language competency in the questionnaire, professional interpreters' overall average IELTS was 7.75. In addition, all of them have a master's degree in Translation and Interpreting from a UK university. Half of them are certificate holders of CATTI[8] Level 1 and/or Level 2 Interpreter.

3.4.3.2 Questionnaire for student interpreters

Among the ten student interpreters, only one student reported that s/he had received five terms of SI training. The other students had received one term of SI training for each direction.

In terms of the duration of the SI module provided by their universities, all of them reported that the SI module is designed for two hours each week. But eight students reflected that they usually receive less than one hour SI practice for both of the directions. Only two students expressed that the time given to SI practice in the English to Chinese direction is between one and two hours while practice in the other direction is less than one hour.

As for after-class practice, four students claimed that they usually spent less than one hour practising SI in both directions; four other students indicated a length of one to two hours after-class practice in both directions. Only two students reported spending more than two hours doing SI exercises. One student spends more than three hours practising SI in both directions every week. The other student spends more than three hours doing English to Chinese SI practice but allocates two to three hours to the practice in the other direction.

In terms of students' perception of which interpreting direction they think they do well in, no students believed they could interpret equally well in both directions, and half the students were not sure which interpreting direction they are good at. Even though Chinese is the A language for all the participants in this study, only two students thought that they interpret well in the English to Chinese direction. In

[8] China Accreditation Test for Translators and Interpreters (CATTI) is the most authoritative translation and interpretation proficiency qualification accreditation test, which is implemented throughout the country according to uniform standards and in compliance with the national system of professional qualification certificates. The test includes translation and interpretation (consecutive interpretation and simultaneous interpretation). It has four levels: Senior Translator and Interpreter, Level 1 Translator and Interpreter, Level 2 Translator and Interpreter, and Level 3 Translator and Interpreter. http://www.catti.net.cn/2009-11/05/content_228439.htm

comparison, three students believed that they interpret well in the Chinese to English direction.

3.4.3.3 Questionnaire for professional interpreters

In terms of the average number of days that professional interpreters provide SI in a year, five of them provide less than 20 days' SI. An equal number of interpreters provide 41 to 60 days' and more than 80 days' SI service in a year. Only one interpreter reported that the SI tasks s/he conducts is between 61 and 80 days.

As for the percentage of tasks they perform in each direction on average in the real-life scenario, no interpreters reported that they only perform SI in the English to Chinese direction or Chinese to English direction. For interpreters who receive SI tasks in both directions, three of them reported that they receive about equal numbers of jobs in both directions. Five interpreters reflected that they have more Chinese to English SI tasks while only three interpreters expressed that they receive more SI tasks in the English to Chinese direction. Based on the information provided by the participants, it is evident that the market requires interpreters who work in the language pair of English and Chinese to provide SI in both directions instead of interpreting only into their A language.

Regarding professional interpreters' views on which interpreting direction they are more capable of providing a better performance, two interpreters were not sure about which interpreting direction they are more capable of. Six professional interpreters believed that they interpret better in the Chinese to English direction. This might be related to the fact that interpreters in this study reported receiving more SI jobs in this direction. Therefore, they are more confident and proficient in interpreting into English. Two interpreters expressed that they perform better in the English to Chinese direction. No interpreter reported that they could do equally well in both directions.

3.4.4 Speech materials

As mentioned in Chapter 1, there are many factors that may influence the performance of SI, such as accent (e.g., Gile, 1995), delivery speed (e.g., Cooper, Davies, & Tung, 1982) and noises (e.g., Gerver, 1974). To minimise the influence of these factors on SI performance, the researcher paid special attention to these variables when selecting the speech materials. Moreover, given the fact that both student and professional

interpreters are included in the main study, the speech materials could not be either too colloquial or too technical.

Based on all these factors, two speeches[9] delivered at high-level conferences were chosen. The theme of the speech focuses on women's rights. The original English speech is a keynote address delivered by Hillary Rodham Clinton, former US Secretary of State, at the 2015 UN Women's Empowerment Principles Event organised by Global Compact. The original Chinese speech was delivered by His Excellency Xi Jinping, President of the People's Republic of China, at the global leaders' meeting on gender equality and women's empowerment in 2015. The videos used in the study are all originals for the purpose of compiling authentic corpora.

Both speeches are in the general domain and few specific technical terms are involved. Glossaries (general names of organisations and countries) and general speech information (speaker, speech name) were given to interpreters on-site before the experiment, so that interpreters could take time to look at them. Therefore, no specific preparation of terminologies was needed before participants took part in the study.

Before the experiment, two warm-up videos (not the ones to be used for the experiment) were used to let interpreters become familiar with the speakers' voice, speed, and volume of the speech. The English video is the concession speech delivered by Hillary Clinton in 2016. The Chinese video is the New Year speech given by Xi Jinping in 2016. Participants were notified beforehand that the warm-up videos did not need to be interpreted and they could use this opportunity to warm up and get prepared for the main speech.

In terms of speed of the two speeches, the original English speech lasts for 15 mins 17 seconds with 1909 words and the average speed of this speech is roughly 125 words per minute (wpm). As mentioned in Section 1.2.3.1, Gerver (1975, pp. 120-121) finds the optimal speed to be 100 to 120 wpm and the speed in Galli's study (1990) falls within the range from 106 to 156 wpm. Moser-Mercer (1994) points out that a delivery rate between 90 and 110 wpm would allow interpreters to understand the materials. Vančura's (2013, p. 92) recent research concludes that "everything over 160 wpm was

[9] Both original speeches delivered by the speakers did not contain disfluencies (i.e., filled pauses and repetitions). The original Chinese speech had one self-repair made by the speaker (marked with a bracket in the Appendix IV), and any data related to this repair were excluded from analysis. The original English speech did not entail repairs.

considered fast, average/standard was between 120-160 wpm, and slow was below 120 wpm". Therefore, it is believed that 125 wpm is a suitable speed since speakers at high-level conferences usually have a much faster speed. For the original Chinese speech, the total duration is 11 mins 11 seconds with 1,806 words. Therefore, the average speed is 161 characters per minute. This speed falls within the optimal speech rate of 150-180 characters per minute proposed by Li (2010).

3.5 Statistical analysis

The study also adopts a quantitative method. This section particularly focuses on how data is analysed from the view of a statistical test.

Inferential statistics are frequently used in translation and interpreting studies showing the significance or non-significance of measured and calculated values that are entered into software (see, e.g., Christoffels, De Groot, & Waldorp, 2003; Korpal & Stachowiak-Szymczak, 2020; Wang, 2014). The aim is to either reject or not reject the proposed hypotheses (Gile, 1998, p.76).

In the current study, as mentioned earlier, the hypotheses to be tested in the statistical tests are the following:

(1) If directionality has an impact on the SI disfluency frequency (filler frequency and repetition frequency) for both student and professional interpreters, then disfluency frequency in Chinese to English SI will be higher than that in English to Chinese SI for both groups;

(2) If directionality has an impact on repair frequency for both student and professional interpreters, then repair frequency in Chinese to English SI will be higher than that in English to Chinese SI for both groups;

(3) If directionality has an impact on the performance of both student and professional interpreters in two directions, professional interpreters will have less disfluency frequency and repair frequency than student interpreters in both directions.

The null hypotheses are that there will be no differences in disfluency and repair frequency for either group across the two directions and in performance between two groups across the two directions.

To test the first and second hypothesis, this study respectively compares the SI disfluency frequency (filler frequency and repetition frequency) and repair frequency of both interpretation directions within each group by means of the calculation of frequency times divided by interpretation duration.

These results were entered into SPSS 26 for inferential statistical analysis. The statistical tests that are used to verify the first and second hypothesis include paired-samples t-test (also known as dependent means t-test or matched-pairs t-test, which is a parametric test) and Wilcoxon signed-rank test (a non-parametric test). According to Field (2000, p. 207), both paired-samples t-test and Wilcoxon signed-rank test can be used when there are two experimental conditions and the same group of subjects participated in both conditions of the experiment. In this study, both tests are used to compare the frequency results between English to Chinese SI direction and Chinese to English SI direction within the same group. However, the prerequisite to decide which test is suitable for the data is to see if the data are normally distributed, meaning there are no outliers influencing the results. Therefore, as outliers might result in a non-normal distribution of the data, tests of normality were conducted to screen the collected data before running the analysis. If the significance value is >0.05, this means the data are normally distributed. If the data are not normally distributed, Wilcoxon signed-rank test is used first to run the analysis. Given the fact that there are ten participants in each group, which is a small sample for statistical tests, any occurrence of outliers might influence the results greatly. Therefore, the decision was made to remove the outliers, if any, to run the analysis in the paired-samples t-test again, and to see if there was any difference in the results. If the data are normally distributed without any outliers, paired-samples t-test are used. P value in both tests is an indicator to determine if the result is statistically significant. If the p value is <0.05, this means there is a statistical significance for the measured data.

For the test of the third hypothesis, inter-group comparison is made between students and professionals regarding disfluency frequency (filler and repetition frequency), as well as self-repairs frequency. The statistical tests used include Mann-Whitney U test and independent t-test. Both tests can be used to compare the means of two different groups under the same experimental conditions. Similar to the conditions of using Wilcoxon signed-rank test and paired-samples t-test, the use of either Mann-Whitney U test or independent t-test is based on whether the data are normally distributed. According to Field (2000, p. 233), independent t-test can be used to compare the means of two unrelated groups to examine if they are statistically different, assuming the data are normally distributed. If the data are not normally distributed,

Mann-Whitney U test is used first to test the hypothesis before running an independent t-test with the removal of any existing outliers.

3.6 Pilot study and main study

3.6.1 Pilot study

Before running the main study, two students (their data were excluded from the main study) who had one term (roughly three to four months) English-Chinese SI training in a UK university but had no any conference interpreting experience were selected to take part in a pilot study to test the appropriateness of materials. Student interpreters were chosen because of the cost of using professional interpreters, particularly if the pilot study was unsuccessful. Students who have received SI training have the ability to help test the materials (Chang, 2005; Wang, 2016).

During the interpreting stage (see Section 3.6.2.1 for detailed procedures), all the interpretations in the pilot study were recorded and retrospective interviews were done immediately after the interpretation. The student was given the original speech script and listened to his/her interpretation paragraph by paragraph, or more than two or three long paragraphs in one go, based on students' memory. Then the student recalled the interpreting process by commenting on the problems or questions incurred during the interpretation. However, given that students might forget some information if they listened to the interpretation of two or three long paragraphs in one go, this procedure was slightly changed in the main study to help them better recall the information – the retrospective interview mostly follows the pattern of listening to the interpretation paragraph by paragraph, or two to three paragraphs if the length is rather short.

Based on students' feedback, no accent problem was found in the original videos and the speed was acceptable. In terms of speech content, students reported that both materials are in the general domain but with some specific organization names, and the difficulty level for both speeches is appropriate.

Since there are only two students in the pilot study, the original source text and interpretation are compared from the perspectives of interpreting problems and process in the study. The results showed that directionality might be a factor that could have an impact on SI performance. In English to Chinese SI, students reported that quite a few problems were related to comprehension (e.g., words, sentence structure) and listening in the interpreting process. In Chinese to English SI, students expressed that

comprehension and listening were not problematic for performance, but production was.

3.6.2 Main study

The following section summarises the compilation of the corpus, data transcription, as well as data analysis in the main study.

3.6.2.1 Procedure

In both the pilot study and main study, the participants followed these steps:

Step 1: After all the necessary documents were filled in, participants were asked to choose which interpreting task (English to Chinese SI or Chinese to English SI) they wanted to do first (see Section 3.4.4 for detailed information about speech materials). As a result, the task order is counterbalanced across subjects in both groups and approximately half of the interpreters chose to perform English to Chinese first, and the other half Chinese to English first. This also helps avoid any influence of unsatisfying performance of the first interpretation on performance of the second interpretation.

Step 2: After their decision, participants were given a one-page document for preparation. This document contains all the relevant information about the interpreting speech for preparation, including name and title of the speaker, the title of the speech, and glossaries. There was no limit for preparation time, within reason.

Step 3: Once the participants confirmed they were ready to start the experiment, the researcher presented a warm-up video of each interpreting direction for participants to get accustomed to the speaker's voice, speed, and tone. Participants did not need to interpret the warm-up videos.

Step 4: After the warm-up session, participants needed to simultaneously interpret the speech in one direction, followed up by a retrospective interview. Both interpretation and interview were recorded on the laptop and mobile phone of the researcher. Between each task, there was a 15-20 mins' break, aimed at reducing fatigue and ensuring interpreting quality.

Step 5: When both interpreting tasks were complete, the pre-agreed remuneration was paid to the participants.

3.6.2.2 Transcription conventions

All the data collected in this research, including interpretations in two directions and retrospective interviews, were transcribed via iFlytek transcription software. The

researcher manually checked the interpretation transcriptions, which were also double checked by another checker to ensure accuracy. Any mistakes spotted by the checker were checked again by the researcher. In terms of the transcriptions of interviews, as they are normally about one hour long for one participant in one interpreting direction, the transcriptions were not manually checked but are used together with the original recordings as a reference in the analysis stage.

With regard to interpretation transcripts, transcription conventions are used by referring to available studies (e.g., Monti, 2005; Wang, 2008). On the linguistic level, all the spoken words are orthographically transcribed. Due to the nature of spoken texts, comma is used in the transcripts, and texts are separated based on the meaning units and syntactic information. Accordingly, full stop is used to indicate the end of a sentence based on the original text. By doing so, it is easier to align STs and TTs in the later stage for text comparison. Numbers, dates, and percentages are fully spelt out in line with the Interinstitutional Style Guide developed by European Parliament (Monti, 2005) and this information is spelt in Chinese characters in Chinese transcriptions.

On the paralinguistic level, annotations in this study focus on truncated, mispronounced words/unfamiliar pronunciation. According to Monti (2005), truncated words in English can be divided into two categories: words that are not fully uttered and internal truncation, which are words that are fully uttered but with interruptions in the speaker's articulation. For words that are not fully uttered, the '-' symbol is used at the end of the word. In Chinese transcription, the symbol '-' is adopted in the same way to represent word truncation. For example, if '民众(mínzhòng)', which equally means the public in English, is partially uttered as '民(mín)', then the transcription is shown as '民-'. If the same character repeated twice, it was marked as '民-民-'. In terms of mispronunciation or unfamiliar pronunciation, the mispronounced or unfamiliar part is represented in the same form of its pronunciation in both English and Chinese. For example, the pronunciation of '存在(exist)' should be 'cúnzài' in pinyin form. If it is pronounced as 'chúnzài', then the mispronounced part is shown as a character which has the same pronunciation '纯 (chún)'. Filler words and filled pauses such as 'em', 'well', 'uh' in English and '嗯 (em, uh)', '这个(well)' are also

marked in both transcripts. All these words are put in square brackets. Table 3-6 shows in detail how the conventions are adopted in the transcripts:

Table 3-6 Transcription conventions

Speech feature	Example in English interpretation	Transcription in English interpretation	Example in Chinese interpretation	Transcription in Chinese interpretation
word truncation	propo	propo-	民	民-
Mispronunciation or unfamiliar pronunciation	proposion	proposion	存在	纯在
Filler sounds and filler words	em, uh, well	[em, uh, well]	嗯，这个	[嗯]，[这个]
Number	10	ten	10	十
Date	2001	two thousand and one	2001	二零零一
Percentage	1%	one percent	1%	百分之一

3.7 Summary

This chapter presented the methodology used in the current study and related issues. It started with the categorisation of disfluencies and repairs, and the difference between these two concepts is particularly important to approach the coding and analysis of the data in a systematic way. Then it introduced the research methods and how this study was designed.

Chapter 4 will present and discuss the results of the analysis of disfluencies, including filled pauses and repetitions, followed by the presentation and discussion of the results of analysing different types of repairs in Chapter 5, across both directions (EN > ZH, ZH > EN) and groups of interpreters (students vs. professionals).

Chapter 4 Analysis of Disfluencies in SI

This chapter focuses on the analysis and discussion of how directionality influences the performance of student and professional interpreters from the point of view of disfluencies. Two types of disfluencies were examined, including fillers and repetitions. Section 4.1 looks at disfluency frequency in both directions for both the student and professional group to determine whether directionality has an influence on SI disfluencies. Section 4.2 looks at filler frequency in both directions for the student group and professional group. The within group comparisons are followed by between group comparisons to determine whether the level of expertise influences the performance of different groups of interpreters. Section 4.3 provides a qualitative analysis and discussion of fillers in the two directions. Section 4.4 reports the quantitative data of repetition for both groups as well as providing a comparison between these two groups. Section 4.5 further explains categories of repetition in English to Chinese and Chinese to English interpretation.

4.1 Impact of directionality on disfluency frequency in SI

To examine the impact of directionality on SI disfluencies, a within group statistical analysis was carried out on the student group and the professional group. In this analysis, the total sum and frequency of filled pauses and repetition (the two disfluency indicators) in each direction were calculated and compared across both interpreting directions (EN <> ZH).

4.1.1 Disfluency frequency: Student group

Table 4-1 below shows the descriptive data of SI disfluencies in general, including the total number of disfluencies presented by the student interpreters, the duration of interpreting in each direction, as well as their frequency.

The table shows that, except for three participants (S4, S6 and S7), disfluencies in the English to Chinese direction tended to happen less frequently than those in the Chinese to English direction.

Table 4-1 SI disfluency frequency: Student group

Participant	Interpreting direction	Total number of disfluency indicators (times)	Duration (minutes)	Frequency (times/minute)
S1	E to C	57	15.033	3.792
	C to E	54	11.217	4.814
S2	E to C	40	15.333	2.609
	C to E	68	11.217	6.062
S3	E to C	8	15.300	0.523
	C to E	22	11.200	1.964
S4	E to C	184	15.283	12.040
	C to E	113	11.150	10.135
S5	E to C	35	15.267	2.293
	C to E	39	11.267	3.461
S6	E to C	21	15.317	1.371
	C to E	13	11.067	1.175
S7	E to C	207	15.317	13.514
	C to E	17	11.117	1.529
S8	E to C	26	15.250	1.705
	C to E	31	11.117	2.789
S9	E to C	15	15.300	0.980
	C to E	25	11.233	2.226
S10	E to C	26	15.267	1.703
	C to E	36	11.283	3.191
Total	E to C	619	152.67	4.054
	C to E	418	111.87	3.736

The following tables present the results of the within group comparisons (student group) examining disfluencies in both interpreting directions. As explained in the Methodology chapter (section 3.5), the distribution of the data are tested for normality. If the data are normally distributed, the data are compared using paired samples t-test. If they are not normally distributed, Wilcoxon signed-rank test is used.

Table 4-2 shows the results of normality tests. English to Chinese disfluency sig is p =0.001 and Chinese to English sig is p =0.040, which are both <0.05. This means the data are not normally distributed. Based on the normality tests, student participants S4 and S7 are outliers.

Table 4-2 Tests of normality: Disfluency analysis with outliers in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C disfluency frequency	.322	10	.004	.694	10	.001
C to E disfluency frequency	.240	10	.106	.837	10	.040

a. Lilliefors Significance Correction

Table 4-3 shows the Wilcoxon signed-rank test results of comparing the frequency of disfluency in English to Chinese SI and Chinese to English SI conditions.

Table 4-3 Wilcoxon signed ranks test: Disfluency analysis in student group

Ranks

		N	Mean Rank	Sum of Ranks
C to E disfluency frequency - E to C disfluency frequency	Negative Ranks	3[a]	6.33	19.00
	Positive Ranks	7[b]	5.14	36.00
	Ties	0[c]		
	Total	10		

a. C to E disfluency frequency < E to C disfluency frequency

b. C to E disfluency frequency > E to C disfluency frequency

c. C to E disfluency frequency = E to C disfluency frequency

Test Statistics[a]

	C to E disfluency frequency - E to C disfluency frequency
Z	-.866[b]
Asymp. Sig. (2-tailed)	.386

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

According to Table 4-3, directionality did not cause a statistically significant difference in the interpreting disfluency between English and Chinese interpretation (Z=-0.866, p=0.386).

Table 4-4 shows the results of the test of normality when outliers S4 and S7 were removed. The data are now normally distributed, as both the English to Chinese disfluency and Chinese to English disfluency sig is >0.05.

Table 4-4 Tests of Normality: Disfluency analysis without outliers in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C disfluency frequency	.190	8	.200*	.962	8	.825
C to E disfluency frequency	.187	8	.200*	.953	8	.745

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-5 shows the results of the paired-samples t-test comparing the frequency of disfluency in English to Chinese SI and Chinese to English SI conditions.

Table 4-5 Paired-samples t-test: Disfluency analysis in student group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C disfluency frequency	1.87200	8	1.023281	.361784
	C to E disfluency frequency	3.21025	8	1.586070	.560760

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C disfluency frequency - C to E disfluency frequency	-1.338250	1.004364	.355096	-2.177919	-.498581	-3.769	7	.007

As shown in Table 4-5, there was a significant difference in scores for disfluency in English to Chinese SI (M=1.87, SD=1.02) and in Chinese to English SI (M=3.21, SD=1.59); t(7)=-3.769, p=0.007. These results suggest that directionality has an impact on the frequency of disfluency. In particular, the results suggest that students tend to have a higher number of disfluency frequencies in Chinese to English SI than in English to Chinese SI.

4.1.2 Disfluency frequency: Professional group

Table 4-6 below shows the descriptive data of the total number of disfluencies in general, including the total number of disfluencies presented by the professional interpreters, the duration of interpreting in each direction, as well as their frequency. The table shows that disfluencies in the English to Chinese direction tended to happen less frequently than those in the Chinese to English direction.

Table 4-6 SI disfluency frequency: Professional group

Participant	Interpreting direction	Total number of disfluency indicators (times)	Duration (minutes)	Frequency (times/minute)
P1	E to C	52	15.333	3.391
	C to E	25	11.167	2.239
P2	E to C	60	15.250	3.934
	C to E	30	11.083	2.707
P3	E to C	58	15.317	3.787
	C to E	18	11.233	1.602
P4	E to C	34	15.267	2.227
	C to E	21	11.150	1.883
P5	E to C	79	15.283	5.169
	C to E	56	11.150	5.022
P6	E to C	58	15.300	3.791
	C to E	8	11.167	0.716
P7	E to C	14	15.300	0.915
	C to E	10	11.117	0.900
P8	E to C	88	15.300	5.752
	C to E	18	11.217	1.605
P9	E to C	33	15.300	2.157
	C to E	37	11.183	3.309
P10	E to C	10	15.283	0.654
	C to E	7	11.083	0.632
Total	E to C	486	152.933	3.178
	C to E	230	111.55	2.062

The following tables present the results of the within group comparisons (professional group) examining disfluencies in both interpreting directions.

Table 4-7 Tests of normality: Disfluency analysis in professional group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C disfluency frequency	.151	10	.200*	.951	10	.676
C to E disfluency frequency	.153	10	.200*	.902	10	.229

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The tests of normality indicate that both significance values are >0.05, meaning that all the values in the dataset are normally distributed and no outliers are identified.

Table 4-8 Paired-samples t-test: Disfluency analysis in professional group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C disfluency frequency	3.17770	10	1.679673	.531159
	C to E disfluency frequency	2.06150	10	1.350856	.427178

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C disfluency frequency - C to E disfluency frequency	1.116200	1.607926	.508471	-.034041	2.266441	2.195	9	.056

The paired-samples t-test results show no significant difference in the scores for disfluency frequency in the English to Chinese direction (M=3.18, SD=1.68) and in the Chinese to English direction (M=2.06, SD=1.35); t(9)=2.195, p=0.056. These results suggest that in terms of disfluency frequency, directionality seems not to be a factor that influences the occurrence of disfluencies; in other words, disfluency frequency has no relation to directionality in the professional group.

4.1.3 Disfluency frequency: Inter-group comparison

This section presents the between group comparison of the disfluency frequency (student group and professional group) on the basis of Table 4-1 and Table 4-6

(Sections 4.1.1 and 4.1.2) for each interpreting direction, starting with the English to Chinese direction and followed by the Chinese to English direction.

As explained in the previous chapter, the distribution of the data was tested for normality. If the data are normally distributed, the data are compared using independent t-test. If they are not normally distributed, Mann-Whitney U test is used.

4.1.3.1 Disfluency frequency: English to Chinese direction

Table 4-9 shows the student group data (group S) are not normally distributed (sig <0.05), whereas the professional group data (group P) are normally distributed (sig >0.05). Again, based on the normality tests, student participants S4 and S7 are outliers.

Table 4-9 Tests of normality: Disfluency analysis with outliers between two groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C disfluency frequency	S	.322	10	.004	.694	10	.001
	P	.151	10	.200*	.951	10	.676

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-10 shows the Mann-Whitney U test results of comparing the frequency of disfluency in the student and professional interpreter groups.

Table 4-10 Mann-Whitney U test: Disfluency analysis between two groups in English to Chinese direction

Ranks

	Group	N	Mean Rank	Sum of Ranks
E to C disfluency frequency	S	10	9.80	98.00
	P	10	11.20	112.00
	Total	20		

Test Statistics[a]

	E to C disfluency frequency
Mann-Whitney U	43.000
Wilcoxon W	98.000
Z	-.529
Asymp. Sig. (2-tailed)	.597
Exact Sig. [2*(1-tailed Sig.)]	.631[b]

a. Grouping Variable: Group

b. Not corrected for ties.

It can be observed that the difference between the student group (group S) and professional group (group P) was not statistically significant (U=43, p=0.597). In other words, when the data of the outliers are included, the disfluency frequency in the student group is not different than that in the professional group.

Table 4-11 shows the results of the test of normality when outliers S4 and S7 were removed. The data are now normally distributed, as the disfluency sig for both groups is >0.05.

Table 4-11 Tests of normality: Disfluency analysis without outliers between groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C disfluency frequency	S	.190	8	.200*	.962	8	.825
	P	.151	10	.200*	.951	10	.676

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-12 shows the results of the independent t-test comparing the frequency of disfluency in the student group and professional group.

Table 4-12 Independent t-test: Disfluency analysis between two groups in English to Chinese direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
E to C disfluency frequency	S	8	1.87200	1.023281	.361784
	P	10	3.17770	1.679673	.531159

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
E to C disfluency frequency	Equal variances assumed	2.479	.135	-1.925	16	.072	-1.305700	.678340	-2.743716	.132316
	Equal variances not assumed			-2.032	15.107	.060	-1.305700	.642665	-2.674661	.063261

There was no significant difference in scores for the student group (group S) (M=1.87, SD=1.02) and professional group (group P) (M=3.18, SD=1.68); t(16)=-1.925, p=0.072 (>0.05). These results suggest that expertise does not have an impact on the general disfluency frequency in the English to Chinese direction.

4.1.3.2 Disfluency frequency: Chinese to English direction

Regarding the Chinese to English direction, the following tables show the results of tests of normality and the between group comparisons of the disfluency frequency (student group and professional group).

Table 4-13 Tests of normality: Disfluency analysis with outliers between two groups in Chinese to English direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
C to E disfluency frequency	S	.240	10	.106	.837	10	.040
	P	.153	10	.200*	.902	10	.229

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The results show that the data of the student group are not normally distributed (sig <0.05). Only S4 is identified as an outlier.

Table 4-14 Mann-Whitney U test: Disfluency analysis between two groups in Chinese to English direction

Ranks

	Group	N	Mean Rank	Sum of Ranks
C to E disfluency frequency	S	10	12.70	127.00
	P	10	8.30	83.00
	Total	20		

Test Statistics[a]

	C to E disfluency frequency
Mann-Whitney U	28.000
Wilcoxon W	83.000
Z	-1.663
Asymp. Sig. (2-tailed)	.096
Exact Sig. [2*(1-tailed Sig.)]	.105[b]

a. Grouping Variable: Group

b. Not corrected for ties.

The results of the Mann-Whitney U test show that there was not a significant difference between the student group (group S) and the professional group (group P) (U=28, p=0.096). In other words, expertise does not appear to have an effect on disfluency frequency.

Table 4-15 Tests of normality: Disfluency analysis without outliers between two groups in Chinese to English direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
C to E disfluency frequency	S	.169	9	.200*	.932	9	.500
	P	.153	10	.200*	.902	10	.229

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-15 presents the results when the outlier (S4) is excluded from the data. Regarding the distribution of the data, the data are now normally distributed (sig >0.05).

Table 4-16 Independent t-test: Disfluency analysis between two groups in Chinese to English direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
C to E disfluency frequency	S	9	3.02344	1.585948	.528649
	P	10	2.06150	1.350856	.427178

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C to E disfluency frequency	Equal variances assumed	.246	.626	1.428	17	.171	.961944	.673668	-.459371	2.383260
	Equal variances not assumed			1.415	15.851	.176	.961944	.679670	-.479994	2.403883

The independent t-test shows no significant difference between the student group (group S) (M=3.02, SD=1.59) and professional group (group P) (M=2.06, SD=1.35); t(17)=1.428, p=0.171 (>0.05). Again, these results suggest that expertise is not a factor that influences the disfluency frequency in the Chinese to English direction.

4.1.4 Summary

To sum up, when outliers are included in the analysis of the student group, disfluency frequency differences between two interpreting directions is not statistically significant. After the removal of outliers, the analysis shows that disfluency frequency in the Chinese to English direction is higher than in the English to Chinese direction. In contrast, for the professional group there is no statistically significant difference regarding disfluency frequency in either direction. In terms of inter-group comparisons, no difference on disfluency frequency can be found between the student and professional groups in either the English to Chinese or the Chinese to English directions.

4.2 Impact of directionality on filled pauses frequency in SI

This section presents the frequency analysis of filled pauses of the two interpreting groups in both directions. This is to determine how directionality influences the fluency level of each group from the perspective of filled pauses frequency. This is

followed by an inter-group comparison to establish whether expertise is related to filled pauses frequency.

4.2.1 Filled pauses frequency: Student group

Table 4-17 below shows the descriptive data of filled pauses, including the number of participants, interpreting direction, total number of filled pauses for each participant in each direction, length of interpretation in each direction, and a frequency count.

Table 4-17 Filled pauses analysis: Student group

Participant	Interpreting direction	Total number of filled pauses (times)	Duration (minutes)	Frequency (times/minute)
S1	E to C	31	15.033	2.062
	C to E	36	11.217	3.209
S2	E to C	18	15.333	1.174
	C to E	49	11.217	4.368
S3	E to C	2	15.300	0.131
	C to E	8	11.200	0.714
S4	E to C	166	15.283	10.862
	C to E	86	11.150	7.713
S5	E to C	24	15.267	1.572
	C to E	31	11.267	2.751
S6	E to C	8	15.317	0.522
	C to E	6	11.067	0.542
S7	E to C	172	15.317	11.229
	C to E	16	11.117	1.439
S8	E to C	20	15.250	1.311
	C to E	23	11.117	2.069
S9	E to C	11	15.300	0.719
	C to E	19	11.233	1.691
S10	E to C	11	15.267	0.721
	C to E	27	11.283	2.393
Total	E to C	463	152.67	3.033
	C to E	301	111.87	2.691

It can be seen that the total number of fillers in English to Chinese is 463 and that of fillers in Chinese to English is 301. With regard to frequency, excepting S4 and S7, it is obvious that the frequency of fillers in Chinese to English is greater that in English to Chinese.

The tables below show the results of analysis of the filler data for the student group.

Table 4-18 Tests of normality: Filled pauses analysis with outliers in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C filled pauses frequency	.390	10	.000	.633	10	.000
C to E filled pauses frequency	.202	10	.200*	.855	10	.066

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-18 shows that the filled pauses data in the English to Chinese direction are not normally distributed (sig <0.05). However, they are normally distributed in the Chinese to English direction (sig >0.05). Based on the normality tests, S4 and S7 are outliers in English to Chinese data and S4 is the outlier in the Chinese to English group.

Table 4-19 Wilcoxon signed ranks test: Filled pauses analysis in student group

Ranks

		N	Mean Rank	Sum of Ranks
C to E filled pauses frequency - E to C filled pauses frequency	Negative Ranks	2[a]	9.00	18.00
	Positive Ranks	8[b]	4.63	37.00
	Ties	0[c]		
	Total	10		

a. C to E filled pauses frequency < E to C filled pauses frequency

b. C to E filled pauses frequency > E to C filled pauses frequency

c. C to E filled pauses frequency = E to C filled pauses frequency

Test Statistics[a]

	C to E filled pauses frequency - E to C filled pauses frequency
Z	-.968[b]
Asymp. Sig. (2-tailed)	.333

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Table 4-19 shows that the difference between the frequency of filled pauses in both interpreting directions was not statistically significant (Z=-0.968, p=0.333). It appears that directionality does not influence the frequency of filled pauses.

Table 4-20 Tests of normality: Filled pauses analysis without outliers in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C filled pauses frequency	.188	8	.200*	.978	8	.950
C to E filled pauses frequency	.132	8	.200*	.969	8	.892

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-20 shows that the data are normally distributed after the removal of the outliers (i.e., S4 and S7).

Table 4-21 Paired-samples t-test: Filled pauses analysis in student group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C filled pauses frequency	1.02650	8	.622994	.220262
	C to E filled pauses frequency	2.21712	8	1.269995	.449011

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C filled pauses frequency - C to E filled pauses frequency	-1.190625	.942777	.333322	-1.978807	-.402443	-3.572	7	.009

Table 4-21 shows there was a significant difference in the scores for English to Chinese SI (M=1.03, SD=0.62) and Chinese to English SI (M=2.22, SD=1.27); t(7)=-3.572, p=0.009. These results suggest that directionality influences filled pauses frequency in English-Chinese SI. Students tend to have more filled pauses in Chinese to English SI than in English to Chinese SI.

4.2.2 Filled pauses frequency: Professional group

Table 4-22 below shows the descriptive data of filled pauses, including the number of participants, interpreting direction, total number of filled pauses for each participant in each direction, length of interpretation in each direction, and a frequency count.

Table 4-22 Filled pauses analysis: Professional group

Participant	Interpreting direction	Total number of filled pauses (times)	Duration (minutes)	Frequency (times/minute)
P1	E to C	38	15.333	2.478
	C to E	19	11.167	1.701
P2	E to C	52	15.250	3.410
	C to E	25	11.083	2.256
P3	E to C	49	15.317	3.199
	C to E	15	11.233	1.335
P4	E to C	29	15.267	1.900
	C to E	14	11.150	1.256
P5	E to C	68	15.283	4.449
	C to E	48	11.150	4.305
P6	E to C	56	15.300	3.660
	C to E	7	11.167	0.627
P7	E to C	2	15.300	0.131
	C to E	1	11.117	0.090
P8	E to C	87	15.300	5.685
	C to E	14	11.217	1.248
P9	E to C	19	15.300	1.242
	C to E	25	11.183	2.234
P10	E to C	4	15.283	0.262
	C to E	1	11.083	0.090
Total	E to C	404	152.933	2.642
	C to E	169	111.550	1.515

Table 4-22 shows that the total number of filled pauses in the English to Chinese direction is 404, compared with 169 in total in the Chinese to English direction. Regarding filler frequency, English to Chinese filled pauses frequency is slightly higher than that in the other direction based on the calculation of times per minute.

The tables below show the results of analysis of the filler data for the professional group.

Table 4-23 Tests of Normality: Filled pauses analysis in professional group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C filled pauses frequency	.122	10	.200*	.968	10	.875
C to E filled pauses frequency	.175	10	.200*	.898	10	.209

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

According to Table 4-23, the data in two directions are normally distributed (sig >0.05) and no outliers are identified.

Table 4-24 Paired-samples t-test: Filled pauses analysis in professional group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C filled pauses frequency	2.64170	10	1.794267	.567397
	C to E filled pauses frequency	1.51420	10	1.242994	.393069

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C filled pauses frequency - C to E filled pauses frequency	1.127500	1.600108	.505999	-.017148	2.272148	2.228	9	.053

As shown in Table 4-24, there was no significant difference in scores for filled pauses frequency in English to Chinese SI (M=2.64, SD=1.79) and filled pauses frequency in Chinese to English SI (M=1.51, SD=1.24); t(9)=2.228, p=0.053. These results suggest that filled pauses frequency is not different regardless of the interpreting direction. In other words, directionality does not have an impact on filled pauses frequency for professional interpreters.

4.2.3 Filled pauses frequency: Inter-group comparison

This section presents the between group comparison of filled pauses frequency (student group and professional group) on the basis of Table 4-17 and Table 4-22 (Sections 4.2.1 and 4.2.2) for each interpreting direction, starting with the English to Chinese direction and followed by the Chinese to English direction.

4.2.3.1 Filled pauses frequency: English to Chinese direction

According to Table 4-25, the data of the student group are not normally distributed (sig <0.05). Based on the tests of normality, the outliers are S4 and S7 (student group).

Table 4-25 Tests of normality: Filled pauses analysis with outliers between two groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C filled pauses frequency	S	.390	10	.000	.633	10	.000
	P	.122	10	.200*	.968	10	.875

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-26 Mann-Whitney U test: Filled pauses analysis between two groups in English to Chinese direction

Ranks

	Group	N	Mean Rank	Sum of Ranks
E to C filled pauses frequency	S	10	9.35	93.50
	P	10	11.65	116.50
	Total	20		

Test Statistics[a]

	E to C filled pauses frequency
Mann-Whitney U	38.500
Wilcoxon W	93.500
Z	-.870
Asymp. Sig. (2-tailed)	.384
Exact Sig. [2*(1-tailed Sig.)]	.393[b]

a. Grouping Variable: Group

b. Not corrected for ties.

Table 4-26 shows that when outliers are included in the analysis, the filled pauses frequency in student and professional group is not statistically significant (U=38.5, p=0.384). In other words, expertise does not appear to have an effect on the filled pauses frequency.

Table 4-27 Tests of normality: Filled pauses analysis without outliers between two groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C filled pauses frequency	S	.188	8	.200*	.978	8	.950
	P	.122	10	.200*	.968	10	.875

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

After removing outliers S4 and S7, the tests of normality show that the data are normally distributed (sig >0.05), as shown in Table 4-27.

Table 4-28 Independent t-test: Filled pauses analysis between two groups in English to Chinese direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
E to C filled pauses frequency	S	8	1.02650	.622994	.220262
	P	10	2.64170	1.794267	.567397

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
E to C filled pauses frequency	Equal variances assumed	6.955	.018	-2.419	16	.028	-1.615200	.667578	-3.030402	-.199998
	Equal variances not assumed			-2.654	11.579	.022	-1.615200	.608650	-2.946704	-.283696

The results of the independent t-test indicate a significant difference in the scores for the student group (M=1.03, SD=0.62) and professional group (M=2.64, SD=1.79); t(16)=-2.419, p=0.028. These results suggest that filled pauses frequency is affected by expertise level in the English to Chinese direction.

4.2.3.2 Filled pauses frequency: Chinese to English direction

The tests of normality show the filled pauses data in the Chinese to English direction are normally distributed (sig >0.05) and no outliers are identified.

Table 4-29 Tests of normality: Filled pauses analysis between two groups in Chinese to English direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
C to E filled pauses frequency	S	.202	10	.200*	.855	10	.066
	P	.175	10	.200*	.898	10	.209

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Based on the table, an independent t-test could be used to compare the two groups.

Table 4-30 Independent t-test: Filled pauses analysis between two groups in Chinese to English direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
C to E filled pauses frequency	S	10	2.68890	2.104878	.665621
	P	10	1.51420	1.242994	.393069

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C to E filled pauses frequency	Equal variances assumed	1.182	.291	1.520	18	.146	1.174700	.773017	-.449347	2.798747
	Equal variances not assumed			1.520	14.596	.150	1.174700	.773017	-.476922	2.826322

According to Table 4-30, there was no significant difference in the scores for student group (M=2.69, SD=2.10) and professional group (M=1.51, SD=1.24); t(18)=1.520, p=0.146. These results suggest that expertise does not influence filled pauses frequency in the Chinese to English direction.

4.2.4 Summary

To sum up, when outliers are included in the analysis of the student group, filled pause frequency differences between the two interpreting directions are not significant. When outliers are removed, filled pauses frequency is higher in the Chinese to English direction than in the English to Chinese direction. In contrast, for the professional group there is no statistically significant difference regarding filled pauses frequency in either direction. In terms of inter-group comparisons, no difference on filled pauses frequency can be found between the student and professional groups in the Chinese to English direction. In contrast, professional interpreters tend to have higher filler frequency in the English to Chinese direction compared to the student group.

4.3 Analysis of filled pauses in SI

This section focuses on the causes for filled pauses in each interpreting direction within the two groups. As mentioned in Section 3.2.2.1, two types of filled pauses are examined in this study, i.e. filler sounds and filler words. Table 4-31 below summarises the use of these two types of filled pauses in each interpreting direction.

Table 4-31 Distribution of filled pauses

Group	Direction	Filler sounds	Filler words
Students	E to C	94.82%	5.18%
	C to E	98.67%	1.33%
Professionals	E to C	68.32%	31.68%
	C to E	100%	0%

According to the table, both students and professionals used more filler sounds than filler words in both directions. However, in the English to Chinese direction, professionals used more filler words than student interpreters, while in the Chinese to English direction, students used more filler words than professional interpreters.

As mentioned in Section 3.2.2.1, the qualitative analysis of filled pauses in this study examines conceptualising, information density, formulating, syntactic difference, and idiosyncrasies. When annotating the data, it was clear that several filled pauses occurred in repetition and self-repairs. Filled pauses made in the context of repetition and self-repairs will be discussed in the analysis of repetition and self-repairs respectively.

All the ST segments (marked as ST) are extracted from the self-built corpora and the interpretations presented in the examples are marked as S/P. For example, student 1's interpretation is shown as S1 and professional 1's as P1. The examples are listed with students' data first, followed by professional ones. All Chinese texts are coupled with gloss translation (Gloss) and back translation (BT) provided by the researcher.

4.3.1 Filled pauses in the English to Chinese direction

4.3.1.1 Conceptualising

Conceptualising is characterised by pauses due to difficulties in listening comprehension and logic analysis. In the English to Chinese direction, several filled pauses were identified due to this trigger in both groups of participants.

Example 4.1 below presents three places (marked as a, b and c in the ST) where interpreters, particularly student interpreters, showed a tendency of listening comprehension difficulty. The first one is the comprehension of the sentence 'Out of Beijing came the Platform for Action'. As shown in the above interpretation examples, the student interpreters have different understanding towards the sentence: (1) there are platforms outside Beijing (S4 and S6); (2) Beijing started the action (S1, S9 and P1). The challenges for the comprehension of this sentence are that the sentence structure in English is inverted with the prepositional phrase leading the sentence as well as the appearance of a term. Though the Chinese translation of 'Platform for Action' had been provided to interpreters for preparation prior to the task, none of the interpreters managed to interpret it correctly. For example, S1 and P1 understood it as action and S4 comprehended it as the platforms that speak out for women. The noun phrase 'an organizing document' is another place where interpreters had problems in

comprehension. In the examples above, only S9 and P1 produced the interpretation of ‘document’ and P1 was found to have a filler within the noun phrase.

The retrospective interview revealed many students did not grasp the meaning of these two sentences. For some interpreters such as S1, S6, S9 and P1, the problem was caused by listening and decoding information. S1, S6 and S9 expressed that they only grasped some of the words in this sentence while interpreting. Therefore, a full comprehension of the ST could not be achieved, and they had to make a guess to complete the sentence meaning. P1 reported that when s/he looked at the script in the retrospective interview, s/he could recognise ‘Platform for Action’ as a term because it is capitalised but s/he could not pick it up in listening.

Example 4.1:

ST: Out of Beijing (a) came the Platform for action (b). And in many parts of the world, it was an organizing document (c).			
Participants	SI	Gloss	BT
S1	北京*[嗯]*开始有所行动 (b)。	Beijing *[um]* start have action (b).	Beijing *[um]* started to have actions (b).
S4	*[嗯]*在北京之外呢 (a)，也有许多的*[啊]*论坛*[嗯]*为女性发声 (b).	*[um]* in Beijing out ne (particle) (a), also have many de (particle) *[ah]* platform *[um]* for women utter voice (b).	*[um]* Outside Beijing (a), there are also many *[ah]* platforms *[um]* that speak up for women (b).
S6	北京之外，是我们*[嗯]* (b)，在世界上的其他地区.	Beijing outside, is our *[um]* (b), in world de (particle) other areas.	Outside Beijing is our *[um]* (b), in other areas of the world.
S9	在此之后，人们从理论开始*[嗯]*转向实践 (b)，开始投入。人们开始编写一些文件。	in this after, people from theory start *[um]* shift to practice (b), start pay attention to. People start compile some document.	After this, people begin to shift from theory *[um]* to practice (b) and put efforts in this. People start to compile some documents.
P1	北京也开始做出了他们的行动。我们开始有一个一个*[呃]*文件 (c)是我们草拟的。	Beijing also start did their de (particle) action. We start have one one *[uh]* document (c) is our draft de (particle).	Beijing has also started their action. We started to have a a *[uh]* document (c) that is drafted by ourselves.

Besides this, the retrospective interview demonstrated that prior knowledge for interpreters might not always promote comprehension in conceptualising procedure. S4 commented that s/he instinctively matched platform in English with '平台 (platform)' in Chinese when s/he heard the word and did not recognise it as a term. This implies that even if a glossary is provided beforehand, interpreters might still intuitively seek the solution that can be quickly accessed based on their own knowledge given the time constraint in SI and have difficulty in recognising what has been learnt in a short period of time in listening and retrieval. However, the lack of prior knowledge of a language variant could also be a problem. As S9 recalled[10]:

> I've been living in the UK for more than two months and I get used to British expressions. I rarely listened to speeches delivered by American speakers as American people might use words that are different from British people. For example, former President Barack Obama likes to quote some classics and you can only understand them with the help of subtitles. This can cause distraction in my listening as I cannot fully focus on it... After I heard 'organizing document', I was thinking such kind of expression is very rare and I did not have a clue. Therefore, I was considering adding a verb to modify 'document'. That is how I came up with 'compile'.

According to the explanation on an official website of the United States Government, 'organizing document' refers to "the trust instrument, corporate charter, articles of incorporation, articles of association or other written instrument by which the organization is created under state law" ("Organizing Documents - Definition," 2020). The definition of this expression is unique to its contextual background. From this perspective, lack of prior knowledge can lead to the failure of comprehension.

Example 4.2 shown below elaborates on filled pauses caused by the comprehension of an expression in the ST.

[10] The retrospective interview was conducted in Chinese and all the information mentioned in the interview was translated into English by the researcher.

Example 4.2:

ST: We may be approaching in some areas critical mass...			
Participants	SI	Gloss	BT
S7	我们可能在*[呃]*有一些方面*[呃]*已经取得一些成就...	we maybe in *[uh]* have some areas *[uh]* already achieve some achievement...	We may *[uh]* have already had some achievements in *[uh]* some areas...
S8	在有的时候，*[呃]*我们会受到一些批评...	in have de (particle) time, *[uh]* we can receive some criticism...	Sometimes, *[uh]* we will receive some criticisms...

The problematic segment lies in the interpretation of 'approach in some areas critical mass'. According to the explanation provided by Investopedia, critical mass refers to "the point at which a growing company becomes self-sustaining, and no longer needs additional investment to remain economically viable" (Kenton, 2019). In S7's interpretation, the interpreter articulated a filled pause before the output '已经取得一些成就 (have already had some achievements)'. Taking the meaning into consideration, it was slightly changed though it is hard to detect the deviation if it is not checked against the ST. This indicates that the interpreter had difficulty in understanding the meaning of 'critical mass'. In S8's version, the interpreter comprehended it as criticism. According to S8's recollection, s/he only remembered hearing the word 'critical' instead of 'critical mass' because s/he was still thinking about the appropriate word choice for 'smart' in the former sentence. Consequently, S8's attention was diverted, which influenced his/her listening, and s/he had to make a guess on the meaning of the whole segment. Hence, it is reasonable that S8 articulated the expression as criticism as the whole meaning unit was not fully heard and comprehension was influenced.

4.3.1.2 Information density

As discussed in Section 3.2.2.1, high density of information content of the ST could lead to an increase in processing capacity (Gile, 2009b). In the ST, there are a few

sentences that have a parallel structure of nouns/noun phrases and verbs/verb phrases, which requires more processing capacity for interpreters. And filled pauses were found to occur within these parallel structures.

Example 4.3:

ST: ...as I look across this hall to see so many leaders from business, diplomacy, government, civil society...			
Participants	SI	Gloss	BT
S4	...看到了如此多的商界、政界、外交界*[嗯][嗯]*以及*[嗯]*以及民间人士来到这里...	...saw so many de (particle) business, politics, diplomacy *[um] [um]* and *[um]* and folks come here...	...We've seen so many people from business, politics, diplomacy *[um] [um]* and *[um]* folks come here...
S5	...看到在场的这么多*[嗯]*商业的领导，还有*[嗯]*外交委员，还有政府领导人...	...see on the spot de (particle) so many *[um]* business de (particle) leaders, and *[um]* diplomatic commissioners, and government leaders...	...There are so many *[um]* business leaders, and *[um]* diplomatic commissioners, and government leaders who are on the spot...
S9	...在在场我可以看到如-非常多的商界领导人，非常多的政府领导人，还有非常多的*[嗯]*民间的一些成员...	...on on the spot I can see su-so many de (particle) business leaders, so many de (particle) government leaders, and so many de (particle) *[um]* civil de (particle) some members...	...On on the spot, I can see su-so many business leaders, so many government leaders and so many *[um]* folk members...

P1	...在今天也有一些从不同领域来的人，包括*[呃]*商界的，还有政界的...	...in today also have some from different area come de (particle), include *[uh]* business, and politics de (particle)...	...Today, there are also people from different fields, including *[uh]* people from business and politics...
P2	...看到这么多*[呃]*人能够聚到一起...	...see so many *[uh]* people can join together...	...We can see that so many *[uh]* people can join together...
P5	...而且我们看到了来自各界的领袖，来自商业、政府*[嗯]*等等各界的领袖[嗯]都来到这里...	...and we have see from different fields de (particle) leaders, from business, government *[um]* etc. different fields de (particle) leaders [um] come here...	...and we've seen leaders from different fields. Leaders from different fields such as business and government *[um]* etc. [um] all come here...

As shown in Example 4.3, both student and professional interpreters were found to have filled pauses when they interpreted the long phrase 'so many leaders from business, diplomacy, government, civil society'. Among these interpretations, student interpreters had a preference to follow the sequence of words and could roughly interpret three out of four words within the parallel structure. It is interesting to notice that S4 added '政界 (politics)' in the interpretation, which was not mentioned in the ST, but did not interpret 'government'. It is very likely that the interpreter mingled the concept of politics and government. The interpreters' recollections demonstrated that parallel structure like Example 4.3 could require more capacity, especially short-term memory, to process it. S5 commented that s/he did not have enough memory capacity at that point and his/her EVS also lagged. Both reasons caused the interpreter to change his/her interpretation strategy in order to make sure s/he could produce a complete sentence.

Professional interpreters also had filled pauses which are caused by high information density as shown in Example 4.3. However, they adopted a different strategy compared with student interpreters. P1, P2 and P5 were all found to generalise the information by providing an interpretation such as ‘many leaders/people from different fields’. P2 did not list specific areas where these leaders are from, but P1 and P5 provided the interpretation of some nouns mentioned in the ST. In the retrospective interview, P2 elaborated that his/her effort was slightly constrained because of the expression ‘look across this hall’ and missed the information of ‘many leaders’. S/he had to find an appropriate noun to compensate for the major noun after s/he heard the prepositional phrase with a series of nouns and needed to make this phrase complete by generalising it. Therefore, it is not surprising that his/her interpretation included a filled pause. However, P1 explicitly expressed that s/he has the tendency to generalise the information when s/he hears a list of nouns since it would cost much effort to deliver each word from English to Chinese interpretation. Therefore, s/he chose to summarise the information before providing one or two specific words mentioned in the ST. P5 had a similar explanation and further commented that “I heard ‘civil society’ but did not get access to the equivalent expression quickly. Therefore, I decided to add ‘etc.’ to include things that were omitted”.

Example 4.4 below exemplifies another parallel structure of nouns where filled pauses were identified among interpretations.

Example 4.4:

ST: ...or encouraging more women to pursue careers in science, technology, engineering or mathematics...			
Participants	SI	Gloss	BT
S4	...我们要让妇女在*[嗯][嗯]*科技和工程等各方面作出贡献...	...we need let women in *[um] [um]* science and engineering etc. every aspect make contribution...	...we need to let women make contribution in every aspect, such as in *[um] [um]* science and technology, etc....
S10	...比如说让女性进入科学、生物、*[呃]*数学等等行业...	...for example, say let women enter into science, biology, *[uh]* mathematics, etc. career...	...for example, letting women enter into careers in science, biology, *[uh]* mathematics, etc....
P8	...还是说让妇女能够更多地参与到*[嗯]*研究教育领域...	...or say let women can more participate in *[um]* research education area...	... or letting women participate more in *[um]* areas of research and education...

Similarly to the situation in Example 4.3, the required processing capacity for a list of nouns, 'science, technology, engineering or mathematics', is larger than the available capacity of interpreters, which leads to the appearance of filled pauses. In S4 and S10's interpretations, it can be found that student interpreters had a preference of following the sequence of ST. In comparison, though a filled pause occurred at the beginning of P8's articulation of this meaning unit, the generalised expression of 'research and education' was adopted.

Example 4.5:

ST: So please visit, learn, share, tweet, organize, mobilize, join us...			
Participants	SI	Gloss	BT
S5	我希望大家能够*[嗯]*开这个网站，然后学到更多的信息，然后开始行动起来...	I hope everyone can *[um]* open this website, then learn more information, then start action...	I hope everyone can *[um]* open this website, learn more information and then start action...
S7	也希望各位呢，*[呃]*和我们一起共同参与进来...	also hope everyone ne (particle), *[uh]* and we together join this...	I also hope everyone *[uh]* can join us...

Example 4.5 shows a parallel structure of verbs. Unlike translation, a series of verbs 'visit, learn, share, tweet, organize, mobilize, join' make it difficult to interpret them one by one in SI given the feature of simultaneity. Instead, interpreters have to seek a compression strategy to summarise the information that was uttered in the ST. As shown in the interpretations, both interpreters were found to articulate a filled pause at the beginning of the meaning unit, which indicates that they probably experienced some difficulties and consciously searched for a quick solution to cope with the challenge. This is reflected in their retrospective interviews. According to S5, he heard 'visit, learn' at the beginning, followed with 'share, tweet, organize' and realised that it might not be easy to quickly provide an interpretation for each word, especially the word 'share'. Therefore, he decided to save the effort and came up with a solution of summarisation. S7 also had the same difficulty, expressing that this segment was too long to follow up with the pace. It was why s/he also had a filled pause and had to summarise the information.

4.3.1.3 Formulating

Any filled pauses due to searching for certain expressions or optimising their usage are categorised as the motivation of formulation. In the English to Chinese direction,

several filled pauses with regard to formulating are related to the retrieval of unknown names.

Example 4.6:

ST: ...the Clinton Foundation and the Gates Foundation...			
Participants	SI	Gloss	BT
S2	...*[啊]*克林顿基金会...	...*[ah]* Clinton Foundation...	...*[ah]* the Clinton Foundation...
S7	...*[呃]*我我的基金会和*[嗯]*盖茨基金会呢...	...*[uh]* my my de (particle) foundation and *[um]* Gates Foundation ne (particle)...	...*[uh]* my my Foundation and *[um]* the Gates Foundation...
P6	...*[嗯]*比尔盖茨基金会还有克林顿基金会...	...*[um]* Bill Gates Foundation and Clinton Foundation...	...*[um]* the Bill Gates Foundation and the Clinton Foundation...
P8	...我们有多个*[嗯]*基金会...	...we have multiple *[um]* Foundation...	...we have multiple *[um]* Foundations...

This example demonstrates the filled pauses linked to the interpretation of the names of Foundations, which are the Clinton Foundation and the Gates Foundation. S7 and P6 managed to provide a complete version after the utterance of filled pause while S2 only articulated the Clinton Foundation. As for P8, the interpreter used multiple Foundations to cope with the problem of unknown names.

Example 4.7 is another example which shows filled pauses caused by the search for interpretation of unknown names.

Example 4.7:

ST: We saw institutions like the World Bank and the International Monetary Fund...			
Participants	SI	Gloss	BT
S7	我们也看到像世界银行、*[呃]*IMF等等机构呢...	We also see like World Bank, *[uh]* IMF etc. institution ne (particle)...	We also saw institutions like the World Bank, *[uh]* IMF, etc....
P6	*[嗯]*世界银行、国际基金委员会...	*[um]* World Bank, International Fund Committee...	*[um]* the World Bank, International Fund Committee...

Based on the example shown above, it appears that both interpreters might be having problems with the interpretation of the World Bank and/or the International Monetary Fund, which are two names of institutions. The filled pause in S7 appeared in between the two institutions, which likely suggests that the interpreter struggled with the IMF. P6 articulated the filled pause before speaking out the interpretation of the World Bank. According to the interview, P6 expressed that s/he had not interpreted IMF into Chinese for ages and was not sure how this term is officially interpreted. When s/he heard the World Bank, s/he had the intuition that the speaker might say IMF right after the World Bank. Even though it is also likely that the speaker may not say the IMF, his/her mind had been trapped into thinking out the interpretation of IMF in Chinese before the articulation of the World Bank. S/he further commented that this term can be handled in a swift way into business organization in an unofficial conference. However, given the context, s/he thinks it is necessary to interpret it into Chinese. Based on what was recalled by P6, the filled pause in his/her interpretation is also associated with the interpretation of IMF. The difference between the student interpreter and the professional interpreter in this example is that the professional interpreter had a prediction of the incoming message and may prepare for the solution to cope with the problem. To some extent, filled pause is related to the problem trigger that occurs in the thinking process.

Another reason for filled pauses relates to the situation when interpreters failed to quickly determine the meaning or expression of a certain word or phrase. The following examples provide further explanation based on the ST.

Example 4.8:

ST: ...announced a sweeping new report that marshals 20 years of data from around the world...			
Participants	SI	Gloss	BT
S4	...*[嗯]*Marshall 的二十年的这个数据...	...*[um]* Marshall de (particle) twenty years de (particle) this data...	...*[um]* the twenty years' data of Marshall...
S5	...我们*[嗯]*记录了...	...we *[um]* recorded...	...we *[um]* recorded...
S7	...我们就有*[嗯]*发布...	...we already have *[um]* publish...	...we've already *[um]* published...
S8	...有很多报告共同*[嗯]*评估...	...have many report together *[um]* evaluate...	...there are many reports which jointly *[um]* evaluate...
P1	...全球我们都*[呃]*采集了一些数据...	...globe we all *[uh]* collected some data...	...we've *[uh]* collected some data all over the globe...
P5	...[嗯]在过去二十年的*[这个][嗯]*记录里面...	...[um] in the past twenty years de (particle) *[well] [um]* record in...	...*[well] [um]* in the record of [um] the past twenty years...
P8	...提出*[嗯]*他们做出了研究...	...propose *[um]* they did research...	...proposed that *[um]* they've done research...

The example shown above demonstrates a formulation-related problem with the word ‘marshal’. ‘Marshal’ is usually understood as a noun, meaning either an officer of the highest rank in the army or a federal or municipal law-enforcement officer in the US. However, this word, based on the context, is used as a verb with the meaning of gathering and organising something, which is a relevantly unfamiliar use to interpreters. Apart from P1’s interpretation, the meaning of the other interpretations listed above deviated from that in the ST. Interpreters expressed that the appearance of ‘marshal’ hindered their comprehension towards the ST and the consequence is reflected as filled pauses in their interpretations.

Example 4.9:

ST: ...if we closed the gap in workforce participation between men and women...			
Participants	SI	Gloss	BT
S1	...如果我们我们缩小男女之间的*[嗯]*鸿沟...	...if we we narrow men women between de (particle) *[um]* gap...	...if we we narrowed the *[um]* gap between men and women...
S2	...如果我们减少*[嗯]*男女之间的差异...	...if we reduce *[um]* men women between de (particle) disparity...	...if we reduce *[um]* the disparity between men and women...
S5	...如果我们在工作场所的*[嗯]*男女平等把它缩小的话...	...if we in workplace de (particle) *[um]* men women equality ba (function word) it narrow if...	...if we narrow *[um]* gender equality in workplace...

P1	...如果我们在*[呃]*工作上可以减低男女不平衡的问题...	...if we at *[uh]* work can reduce men women imbalance de (particle) problem...	...if we solve the problem of imbalance between men and women at *[uh]* work...
P4	...如果我们在工作中减少男女的参与的*[这个][嗯]*鸿沟...	...if we at work reduce men women de (particle) participate *[well] [um]* gap...	...if we reduce *[well] [um]* the gap of participation between men and women at work...
P5	...如果我们能够缩小在工作岗位当中男性和女性之间的*[嗯]*工薪水平...	...if we can narrow in workplace men and women between de (particle) *[um]* salary level...	...if we can narrow *[um]* the salary level between men and women in workplace...

In this example, interpreters' filled pauses are mainly caused by the phrase 'close the gap'. As shown above, there are different versions regarding the interpretation of this phrase. For example, both S1 and S2 understood it as to reduce the gap or disparity between men and women. S5 interpreted the gap as gender equality. P1 and P4's version is similar, which focus on the problem of imbalance. As for P5, the interpreter interpreted it into 'narrow the salary level', but it is not an idiomatic expression in Chinese because the verb and the object do not match. Besides, the meaning of the ST is deviated in interpretation. Most of the interpreters' recollections reflected that their interpretations were obstructed by this phrase as they were not able to have quick access to the appropriate expression of it, which led to the consequence that some people did not hear 'workplace participation' as they only focused on searching for the expression.

Example 4.10:

ST: If she were born in Nepal or Afghanistan (a), there was a tragically high chance (b) that her mother would die in childbirth (c).			
Participants	SI	Gloss	BT
S1	如果她在尼泊尔或者*[嗯]*阿富汗 (a)，女性经常会因为生产而死亡。	If she in Nepal or *[um]* Afghanistan (a), women often can because childbirth death.	If she were in Nepal or *[um]* Afghanistan (a), women would often die because of childbirth.
S4	*[嗯]*如果她出生在尼泊尔或者阿富汗 (a)，*[嗯]*她很可能就不幸的会有这样一个*[嗯]*情况 (b)，就是她的妈妈可能会死于*[嗯]*生产 (c)。	*[um]* If she born in Nepal or Afghanistan (a), *[um]* she very possible unlucky can have this one *[um]* situation (b), that is her mother possible can die from *[um]* childbirth (c).	*[um]* If she were born in Nepal or Afghanistan (a), *[um]* she would be very likely to be in an unlucky *[um]* situation (b) that her mother would die from *[um]* childbirth (c).
S5	在尼泊尔出生的一个女孩，她的*[嗯]*母亲在过去很可能会在生她的时候就死掉 (c)。	In Nepal born a girl, her *[um]* mother in the past very possible can in give birth to her time die (c).	If a girl were born in Nepal, her *[um]* mother was likely to die from giving birth in the past (c).

P5	那么在之前在阿富汗的女性，*[嗯]*她们的妈妈有可能会在*[嗯]*难产中死亡 (c)。	then in the past in Afghanistan de (particle) women, *[um]* their mother have possible can in *[um]* childbirth in die (c).	Then in the past, if women were in Afghanistan, *[um]* their mother would be likely to die in *[um]* childbirth (c).
P6	如果是尼泊尔或者是阿富汗的孩子女孩，那么，可能*[这个]*她的妈妈在生她的时候就会去世 (c).	If is Nepal or is Afghanistan child girl, then, possible *[well]* her mother in give birth to her de (particle) time will die (c).	If she were a child girl in Nepal or Afghanistan, then it is possible that *[well]* her mother would die in childbirth (c).
P8	*[那]*如果一个女孩是在尼泊尔或者是*[嗯]*阿富汗去出生的话 (a)，*[那]*很可能这个女性的*[嗯]*出生时的*[这个]*死亡率是很高的 (c)。	*[Well]* If a girl is in Nepal or is *[um]* Afghanistan go birth if (a), *[well]* very possible this women de *[um]* birth de *[well]* mortality rate is very high (c).	*[Well]* If a girl were born in Nepal or *[um]* Afghanistan (a), *[well]* it is very possible that *[well]* mortality rate would be very high when this woman is *[um]* born (c).

This example shows multiple filled pauses, including filler sound (嗯, um) and filler words (那 and 这个, well), which were identified among interpreters. The possible triggers were divided into three independent parts, marked as (a), (b) and (c) in the ST.

S1, S4 and P8 were found with filled pauses in part (a) where the problem might be associated with the interpretation of either Afghanistan alone or Nepal and Afghanistan as a whole.

As for part (b), it can be noticed that S4 had a problem with the interpretation of 'high chance' and finally came up with a word '情况 (situation)' after the utterance of filled sound. The reason why filled pauses were not found in other interpreters in this example is that they integrated part (b) and part (c) in their interpretation instead of omitting it completely.

When it comes to the interpretation of part (c), all the interpreters except S1 had filled pauses, which are associated with the interpretation of 'childbirth'. In S5's recollection, it is very interesting to notice that the interpreter had an anticipation of something bad when he heard the sentence 'there is a tragically high chance'. After he heard 'would die', he knew for sure that the context is related to childbirth as such content is frequently mentioned. In this case, though the filled sound existed between 'her' and 'mother', the retrospective interview provided by S5 demonstrated that it is highly related to the formulation of 'would die in childbirth' as the interpreter did not mention any possible difficulty with the expression of 'mother' in Chinese. As for other interpreters, they claimed that 'childbirth' was indeed the word that cost some time to think of its equivalent expression during the interpreting process.

According to the interpretations listed in Example 4.11, the occurrence of filled pauses is closely related to the formulation of the prepositional phrase 'in the shadow of genocide and rape'. It is interesting to notice that after interpreters finished the interpretation of 'genocide', 'rape' was omitted in all their interpretations. In S4's retrospective interview, s/he mentioned that s/he thought about the equivalent expression of 'genocide' in Chinese for some time and was not sure if his/her expression was appropriate, which caused the consequence that s/he did not hear 'rape'. This problem also happened to the other interpreters in this example. S5 recalled that after s/he finished the interpretation of 'genocide' with some struggle, the next sentence started, and s/he did not have time to think too much about the rest of the information of the previous segment. Besides, 'rape' only has one syllable, and a word with short duration is hard to catch in the listening process. As for S7, the reason why s/he uttered 'discrimination' is because s/he guessed there must be something bad that happened when s/he heard 'in the shadow of'. Therefore, s/he decided to interpret this part first with an available word regardless of the incoming message. When s/he finished the articulation of 'genocide', s/he also missed the information of 'rape'. As for P5, s/he commented that when s/he heard 'genocide', the equivalent expression in

Chinese did not occur to his/her mind immediately, which lead to the omission in hearing. From this example, it can be concluded that interpreters might struggle with an expression of a certain word in interpretation and their full effort is attached to the specific word. Even when the word is successfully interpreted, it is also coupled with the risk of information omission.

Example 4.11:

ST: A girl born 20 years ago in Rwanda grew up in the shadow of genocide and rape.			
Participants	SI	Gloss	BT
S4	*[嗯]*如果一个二十年前卢旺达的一个女孩出生的女孩，她可能*[嗯]*会受到*[这个]*宗族的*[嗯]*sh-杀绝。	*[um]* If a twenty years ago Rwanda a girl born girl, she might *[um]* can suffer *[well]* clan *[um]* k-kill.	*[um]* If a girl a girl born 20 years ago in Rwanda, she might *[um]* suffer from the *[um]* k-kill *[well]* of the clan.
S5	在卢旺达出生的女孩，她可能会出生在*[嗯]*种族屠杀的阴影中。	in Rwanda born girl, she might can birth in *[um]* genocide de (particle) shadow.	For a girl born in Rwanda, she might be born in the shadow of *[um]* genocide.
S7	*[呃]*过去在卢旺达可能会死于性-性别歧-歧视或者*[呃]*种族诛杀的情况下。	*[uh]* in the past in Rwanda might can die from gen-gender dis-discrimination or *[uh]* genocide de (particle) condition under.	*[uh]* In Rwanda in the past, people might die under the circumstances of gen-gender dis-discrimination or *[uh]* genocide.

P5	那么在卢旺达二十年前的时候，*[嗯]*一位女性是当时生活在一个[嗯]大屠杀的环境当中。	Then in Rwanda twenty years ago, *[um]* a female is at that time live in a *[um]* genocide de (particle) environment in.	Then twenty years ago in Rwanda, *[um]* a female was living in an environment of *[um]* genocide.

Example 4.12:

ST: ...we've nearly closed the global gender gap in primary school...			
Participants	SI	Gloss	BT
S10	...我们的在小学的平均的*[呃]*性别差距有缩小...	...our in primary school de (particle) average *[uh]* gender gap have narrow...	...our average *[uh]* gender gap has been narrowed in primary school...
P2	...我们还没有做到在全球*[呃]*的小学消除障碍...	...we not yet do in global *[uh]* primary school remove barrier...	...we haven't removed barriers in global *[uh]* primary school...
P6	...因为我们可以看到现在*[这个]*小学的性别平等已经基本实现了...	...because we can see now *[well]* primary school de (particle) gender equality already basically achieve le (particle)...	...because we can see now the gender equality *[well]* in primary school has already been achieved...

Example 4.12 shows the challenge of processing information regarding the phrase 'close the global gender gap in primary school' in the English to Chinese direction. In this phrase, the verb is 'close' and the head noun is 'gap' with two modifications, i.e. 'global gender' as premodification, and prepositional phrase 'in primary school' as postmodification. If it is interpreted into Chinese, the position of postmodification

needs to be restructured into ‘the global primary school gender gap’, which requires interpreters to wait until the speaker mentions the prepositional phrase ‘in primary school’. From their interpretations, it can be found that all the interpreters followed this sequence. However, interpreters reflected that the retrieval of ‘gender gap’ in Chinese is the reason why there were filled pauses. As discussed by P2, s/he realised that the speaker mentioned ‘gap’ several times but failed to find the equivalent expression given the short time, which led to translation failure whenever s/he heard this expression in the following paragraphs. The other two interpreters also commented that the relevant expression was not available immediately in their mind.

4.3.1.4 Syntactic difference

As mentioned earlier in Section 3.2.2.1, syntactic difference is characterised by filled pauses due to the ‘headword’ after a long modifier or a meaning unit, caused by grammatical differences between English and Chinese.

Example 4.13:

ST: ...because women and men who understand that gender equality is not just morally right but is the smart thing to do are growing in number.			
Participants	SI	Gloss	BT
S1	无论是*[嗯]*男人女人，它是是最明确的选择，*[嗯]*与日俱增。	no matter be *[um]* men women, it be be most wise de (particle) choice, *[um]* and day increase.	no matter *[um]* they are men or women, it is is the wisest choice, *[um]* grow with each passing day.

The difficulty of interpreting this sentence is that there is a very long attributive clause between the main object ‘women and men’ and the verb ‘grow’. If this sentence is processed by translation into Chinese, the order of the translation needs to start from ‘who understand that gender equality is not just morally right but is the smart thing to do’, followed by ‘women and men’, ‘in number’ and ‘are growing’. It is obvious that such sentence order cannot be followed in SI given the fact that interpreters might not have a memory capacity that is large enough to store so much information. Even though experienced interpreters might be able to store a large amount of information,

it is still likely to lead to the risk of affecting the interpretation of the incoming message. As shown in this example, S1's interpretation is segmented even though s/he followed the sentence order in general. However, it can be seen from the filled pauses that the interpreter seemed to be confused about the sentence structure.

Example 4.14:

ST: All the evidence tells us that despite the obstacles that remain, there's never been a better time in history to be born female.			
Participants	SI	Gloss	BT
S2	所有的这些证据都告诉我们，除了*[呃]*这是在历史上最好的机会，来去*[嗯]*让妇女诞生在这个世界上。	All de (particle) these evidence tell us, despite *[uh]*, this is in history best de (particle) chance, come go *[um]* let women born in this world.	All these evidence tell us that despite *[uh]*, this is the best chance in history to *[um]* let female be born in this world.
S7	*那*这些报告呢是显示*[呃]*不管我们现在面临的障碍有多大，*[嗯]*现在*[呃]*出生成为女性的话，要比过去要更加的幸福。	*[Well]* These report ne (particle) is show *[uh]* no matter we now face de (particle) obstacle have how big, *[um]* now *[uh]* born become female if, than past more happy.	*[Well]* These reports showed that *[uh]* no matter how big the obstacles we are facing now, *[uh]* to be born female *[um]* now is much happier than the past.

This example also shows how syntactic order is different if it is interpreted from English into Chinese and could cause problems in interpretation. In this case, it is not likely the meaning of the whole sentence can be grasped without listening until the end. When processing it into Chinese, interpreters need to change the original English sentence order and interpret it in a form of 'in history, to be born female, there's never

been a better time'. Apart from this, it might be much easier for interpreters to change the negative form 'there's never been' into the positive form in interpretation, such as 'this is the best time', as expressing in a negative form in Chinese would possibly cause more time to process than using a positive form since it needs to articulate more words. From the above two interpretations, it can be seen that both student interpreters had filled pauses in this part but both of them used the positive form. According to what they reflected, S2 mentioned that s/he heard the whole sentence before the articulation and knew what it meant, but s/he felt it was difficult to find an appropriate way to represent the original sentence as well as its meaning. Therefore, s/he decided to follow the original sentence order based on what s/he heard. S7 also had a similar feeling of looking for a better way to represent the sentence order. S/he commented that interpreting a sentence in such a form is not common in his/her practice. Accordingly, when s/he saw it, s/he tended and preferred to use a positive form.

Example 4.15:

ST: ...there are more women serving in her country's parliament than anywhere else in the world.			
Participants	SI	Gloss	BT
P3	那么很多的*[这个]*妇女也从政，而且*[这个]*在议会工作的妇女的数量比任何其他国家都要多。	...Then many *[well]* women also participate in politics, and *[well]* in parliament work de (particle) women de (particle) number than any other countries all want more.	...Then many *[well]* women also participate in politics, and *[well]* the number of women who work in the parliament is more than that in any other countries.

As shown in the above, the original sentence in the English text is a comparative clause. If it is translated it into Chinese, the meaning of 'more' is the last thing to be translated in the sentence. When it comes to interpreting, it is slightly challenging to

interpret it in the way translation does. If interpreters listen until the end of this sentence and then start articulation, this is likely to lead to more cognitive load as well as information loss regarding incoming messages. Given the syntactic difference, interpreters need to use the salami technique to separate the whole sentence into two parts, namely 'there are women serving in her country's parliament' and 'more than anywhere else in the world'. However, regarding the interpretation of the second part, interpreters need to further repeat part of the prior information to make a complete sentence in Chinese. P3's interpretation exemplified what has been discussed above. Nevertheless, it can still be noticed that filled pauses caused by syntactic difference occurred when the interpreter processed this sentence.

4.3.1.5 Idiosyncrasies

It has been discussed in Section 3.2.2.1 that idiosyncrasies refer to filled pauses caused by interpreters' personal behaviours. The examination of all the available interpretations in the English to Chinese direction shows that two (P6 and P8) out of ten professional interpreters in the corpora frequently used the filler word '那 (well)' to start a sentence in their interpretation, as well as using filler sounds in other places in a sentence. Among the filled pauses identified in P6 and P8's interpretation, 39.3% and 51.7% of filled pauses respectively were related to the filler word '那 (well)'. However, such a phenomenon is rarely attested among student interpreters. Besides, this was not found in the Chinese to English direction for either group of interpreters. The following examples extracted from the corpora illustrate this phenomenon.

Example 4.16:

ST: And now, of course, that I'm a grandmother...			
Participants	SI	Gloss	BT
P6	*[那]*现在作为一个祖母...	*[Well]* now as a grandmother...	*[Well]* now as a grandmother...

In this example, no problem regarding the understanding or meaning of the ST was reported from interpreters. However, it is noticed that P6 added a filler word, i.e., '那 (well)', at the beginning of this sentence. This is also embodied in P8's interpretation, as shown below in Example 4.17:

Example 4.17:

ST: I'm excited by where we are...			
Participants	SI	Gloss	BT
P8	*[那]*我很高兴看到我们今天所取得的成就...	*[Well]* I very happy see we today achieved accomplishment...	*[Well]* I'm very happy to see what we've achieved today...

Based on the context, the ST is also a simple sentence which expresses the meaning of accomplishments that have been achieved so far. Similarly to P6's habitual use, P8 was also found to use the filler word '那 (well)' when s/he started the articulation.

In the retrospective interviews, both of the interpreters expressed that they did not realise that it is a filled pause, and they used this word as a language habit. Therefore, both two examples demonstrate that the use of filler word as a habitual language does exist in the interpretation from English to Chinese and filled pauses are not always related to problem triggers.

4.3.2 Filled pauses in the Chinese to English direction

4.3.2.1 Conceptualising

Given that Chinese is the A language for all the interpreters in this study, only one case of filled pauses was found to relate to listening comprehension and logic analysis in both student and professional groups based on the retrospective interview. This is illustrated in the example below.

Example 4.18:

ST: 面对恐怖和暴力肆虐，妇女也深受其害。 Gloss: face towards terrorism and violence rage, women also deep suffer its harm TT: Women tend to suffer deeply in front of terrorism and violence.	
Participants	SI
P9	Facing *[um]* violence and other *[um]* discriminations, women are the most affected.

Based on the interpretation, the interpreter basically followed the source language-oriented principle. Fillers occurred twice in the participle phrase. The first filler appeared when the interpreter articulated 'violence' and the second filler is prior to the word 'discriminations'. It is interesting to notice that the interpreter articulated 'violence' instead of 'terrorism' first and it is followed by 'other discriminations'. The root cause might be related to the uncertainty of the expression of '恐怖 (terrorism)' in the logic analysis. Based on the interpreter's comments, s/he mentioned that s/he did hear the word '恐怖 (terrorism)' and the word 'terrorists' or terrorism' did occur to the interpreter's mind. However, the interpreter felt s/he did not understand why '恐怖' appeared here based on the context. The interpreter wondered if s/he mistakenly heard the word 'terrorism' in the ST and s/he was confused then. Therefore, this is the reason why the first filler appeared before the word 'violence' since the interpreter had uncertainty regarding the appropriateness of the word in the ST. Concerning the second filler, as 'other' had been uttered the interpreter needed to find an equivalent expression which made sense in the context of the ST.

4.3.2.2 Information density

In the Chinese to English corpora, it was found that interpreters tended to use a filled pause when they encountered parallel structures. The examples below provide further details.

Example 4.19:

ST: 妇女接受教育、婚姻自由、职业自由等已经成为社会共识。

Gloss: women accept education, marriage freedom, career freedom, etc., already become society consensus.

TT: It has become a social consensus that women have access to education and freedom of marriage and employment.

Participants	SI
S4	Women *[um]* have the rights f- have their endured rights for *[um]* career freement and education and employment.
S9	Education *[uh]* and freedom in marriage and profession is now approved by the whole society.

In the ST, a word and two noun phrases '教育、婚姻自由、职业自由 (education and freedom of marriage and employment)' form a parallel structure. Two interpreters were identified to have filled pauses with this segment. S4 articulated a filler, followed by a sequence of career, education and employment. The reason might be the interpreter had already listened to the full segment and 'career' is the last word of this segment which the interpreter remembered clearly. Therefore, the interpreter's cognitive load could be slightly reduced, and s/he could save more capacity to think about the interpretation of the other two parts by saying out 'career' first. However, 'freedom' was mistakenly articulated as 'freement' and 'marriage' was substituted with 'employment'. According to the recollection, s/he was so eager to interpret the whole segment that s/he did not coordinate the efforts very well. S/he also realised that the word 'freement' was incorrect during the retrospective interview. But in the interpreting process, s/he did not know why s/he said this word. S9 interpreted 'education' first by following the sequence of the ST, but a filled pause existed in between 'education' and 'freedom of marriage'. Both examples showed that a series of noun or noun phrases can increase interpreters' cognitive load and require more capacity to process them.

Example 4.20:

ST: 特别是要关注农村妇女、残疾妇女、流动妇女、中老年妇女、少数族裔妇女的健康需求。

Gloss: especially be need pay attention to rural area women, disabled women, migrant women, middle old age women, minority ethnicity women de (particle) health need.

TT: especially pay attention to the health needs of women in rural areas, women with disabilities, migrant women, middle-aged and senior women and women of ethnic minorities.

Participants	SI
S1	We need to focus on their healthcare, especially for *[em]* elder women, disabled women and a variety of women.
S2	especially *[um]* women *[uh]* in middle age.
S4	*[um]* especially those of *[um]* disabilities, illness and *[um]* elderly women.

In this example, the speaker listed a series of groups of women that need special attention, and it is obvious that this was a considerable challenge to the interpreters as consecutive filled pauses appeared in their articulation. Besides, the interpreters only managed to interpret a few from the list. For example, in S1's articulation, the interpreter mentioned elder women and disabled women and used a variety of women to include all the other groups of women that s/he failed to mention. S1's recollection reflected that s/he did not start articulation until s/he heard middle-aged and senior women and when s/he wanted to add information, s/he had either already forgotten what the speaker mentioned at the beginning or had been unable to retrieve women in ethnic minorities in English quickly. It shows that the interpreter might have realised the parallel structure but did not have enough capacity and effort to interpret all the content. Instead, s/he had to adopt a condensation strategy to make up for the saturation. In comparison, S2 and S4 were only able to interpret part of the message. Given the

information density, both interpreters commented that information was omitted in their interpretation. S4 further added that even though these phrases consist of four to five characters, interpreters need to change phrase structure and use different patterns to combine those phrases as the English expressions are not in the same structure as in Chinese. Besides, s/he had a wrong anticipation because s/he thought disability would be followed by illness. This explains why disabilities and illness occurred together in his/her interpretation.

4.3.2.3 Formulating

In the Chinese to English corpora, a certain number of filled pauses were found to be linked to unknown names composed of several words or names if the target version is unknown to interpreters. The examples below elaborate how unknown names caused obstacles in SI output.

Example 4.21:

ST: 我们刚刚通过 2015 年后发展议程...	
Gloss: We just pass two zero one five year after development agenda...	
TT: We've just adopted the Post-2015 Development Agenda...	
Participants	SI
S9	We have just passed *[um]* our post twenty fifteen development goals.
S10	We just passed the *[um]* plan for development after twenty fifteen.
P5	*[um]* We have just passed the agenda in two thousand fifteen and gender equality has become an important part of this agenda.

In this example, the difficulty lies in the lexical retrieval of '2015 年后发展议程 (the Post-2015 Development Agenda)'. In Chinese, it is more frequent to hear the expression which is equivalent to 'the development agenda in XXXX(Year), or XXXX(Year) Development Agenda' in English. As shown in S10's interpretation, the filled pause appeared within this noun phrase. In P5's interpretation, the filled pause occurred only at the beginning of the sentence. According to P5's recollection in the

retrospective interview, s/he mentioned that "I was slightly obstructed by the phrase '2015 年后发展议程 (Post-2015 Development Agenda)', especially the character '后 (post)' as it sounds very unfamiliar to me". In S9's interpretation, though the interpreter managed to produce a correct version, a filled pause still occurred, which also reflects the cognitive problem when the interpreter encountered this term.

Example 4.22:

ST: 20 年前，在北京，第四次世界妇女大会通过了《北京宣言》和《行动纲领》...	
Gloss: Twenty years ago, in Beijing, the Fourth World Women Conference adopted Beijing Declaration and Action Platform...	
TT: Twenty years ago, the Fourth World Conference on Women adopted the Beijing Declaration and the Platform for Action...	
Participants	SI
S2	Twenty years ago in Beijing, the fourth *[uh] [uh]* which agreed on Beijing Declaration and Platform for Action...
P8	The World Conference of Women in Beijing have *[ah]* generated Beijing Declaration and Platform for Action...

This is another example which reflects the difficulty in providing a successful interpretation of an unknown name, which here is the conference name '第四次世界妇女大会 (the Fourth World Conference on Women)' and the names of official documents. As shown in S2's interpretation, the interpreter articulated two filled pauses but failed to produce the conference name. Due to the time constraint, the interpreter had to move on to the next meaning unit. However, it is interesting to notice that both 'Beijing Declaration' and 'Platform for Action' were interpreted correctly. This might be likely to be in relation to the preparation work at the beginning of the interpretation, as both names were on the glossary list provided to interpreters before each interpretation task so that interpreters could prepare. Compared with the student's interpretation, the professional interpreter's version is correct and complete in meaning

though there are some minor grammar mistakes. The professional interpreter reflected that for 'the Beijing Declaration and the Platform for Action' it took him/her some time to think of the interpretation as s/he did not refer to the glossary while interpreting and this caused him/her to miss listening to some words as well as a delay in providing the interpretation of the next segment.

Apart from the previous two examples which focus on the difficulty in providing an accurate term, the following examples show the triggers of filled pause from the perspective of searching for an equivalent expression in English.

Example 4.23:

ST: 打破有碍妇女发展的落后观念和陈规旧俗。 Gloss: break have obstacle women development de (particle) outdated mentalities and customs. TT: dismiss outdated mentalities and customs that hinder women's development.	
Participants	SI
S2	broke *[uh]* old rules.
S4	break all the *[um]* old traditions that are toxic to women.

This example shows that interpreters experienced the problem of finding an equivalent expression of '落后观念和陈规旧俗 (outdated mentalities and customs)'. In Chinese, four-character phrases are commonly used, especially in official documents with a high register. Based on the output provided by S2 and S9, it was noticed that interpreters finally managed to interpret the second four-character phrase but not the first one. Besides this, both versions adopted the adjective 'old', which to some extent is explained by the fact that 'old' is the quickest solution that interpreters were able to come up with given the pressure of short time. According to the retrospective interview, the first interpreter expressed that the available interpretation that occurred to his/her mind was 'old rules'. Similarly, this applied to the second interpreter. The second interpreter further commented that the phrase 'be toxic to' was used to express the idea of '有碍 (hinder)' as s/he learned the use of 'toxic' not a long time ago and thinks this word can be flexibly used.

Example 4.24:

ST: 今天，北京世界妇女大会所宣示的精神，在世界催生了积极变化。 Gloss: today, Beijing world women conference suo (particle) claim de (particle) spirit, in world has catalysed positive change. TT: Today, the spirit championed by the World Conference on Women in Beijing has catalysed positive changes in the world.	
Participants	SI
S4	This has produced great *[um]* changes and improvement in the world.
S7	Today Beijing, a world conference on women has *[um]* brought about positive impact.

In this example, the phrase '催生了积极变化 (has catalysed positive changes)' posed challenges to interpreters in the production process. In the first interpretation, the filled pause appeared between 'great' and 'changes' while the filled pause in the second interpretation occurred within the verb phrase 'has brought'. This illustrates that both interpreters were struggling to find an appropriate expression for the verb or the noun phrase.

Example 4.25:

ST: 为实现男女平等的崇高理想，人类走过了不平坦、不平凡的历程。 Gloss: for realize men women equality de (particle) lofty goal, humankind walked extraordinary uphill de (particle) journey. TT: To achieve the lofty goal of gender equality, humankind has gone through an extraordinary and uphill journey.	
Participants	SI
S4	The human beings have *[um]* undergone great changes *[um]* in this great cause.
S5	We've made huge strides through *[uh]* widened cau- cause to achieve this goal.
P4	To deliver this goal, the human has passed a *[um]* uneven journey.
P8	To make sure that we have gender equality we have asked, we have *[um]* overcame lot of difficulties.

This is another example which manifests the trigger of filled pauses due to the problem of lexical retrieval in the articulation process. According to the ST, we can see that the root cause is '走过了不平坦、不平凡的历程 (have gone through an extraordinary and uphill journey)'. Both S4 and P8 were found to have a filled pause within the verbal phrase 'have undergone' and 'have overcome' respectively, which shows that interpreters were likely to search for an appropriate expression for the main verb '走过了'. S4, S5 and P4 had filled pauses when they interpreted two adjectives '不平坦' and '不平凡' in the noun phrase. According to the reflections by interpreters, the available interpretations did not occur to them immediately. Therefore, it can be concluded that filled pauses can be a manifestation of the cognitive process of searching for expressions.

4.3.2.4 Syntactic difference

In the Chinese to English corpora, filled pauses caused by syntactic difference in the English to Chinese direction were attested as illustrated below.

Example 4.26:

ST: 时至今日，针对妇女的各种形式歧视依然存在... Gloss: time to today, against women de (particle) all kinds of form discrimination still exist... TT: Until today, various forms of discrimination against women still exist...	
Participants	SI
S2	*[um] [um]* Until now, a discrimination on women is still exist...

As shown in this example, the interpreter seemed to experience great challenges when interpreting this segment as two filled pauses were identified at the beginning of articulation. The possible reason for two filled pauses might be the long modifier of the head noun in the ST. In the original text, '歧视 (discrimination)' is the head noun and '存在 (exist)' is the main verb with an adverbial '依然 (still)' in front of it. The prepositional phrase '针对妇女的各种形式 (all forms of ... against women)' is a modifier of the head noun, which forms a long noun phrase. Given the fact that it was not possible to produce the output without the determination of the head noun until the interpreter managed to capture the whole noun phrase, s/he had to store the prepositional phrase in short-term memory and then produce the output when the head noun appears.

Example 4.27:

ST: 发达国家要加大对发展中国家的资金和技术援助... Gloss: developed countries should enhance to developing countries de (particle) finance and technology aid... TT: Developed countries should scale up the financial and technological assistance to developing countries...	
Participants	SI
S5	Those developlan- developed countries should *[uh]* enhance its financial aid in developing countries to help this cause...
S9	Developed country should *[uh]* help to support developing country in funds and technologies...
P1	And all womans in the world should share their views on this and also *[uh]* promote the cooperation in terms of technology...

This is another example of filled pauses caused a by syntactic difference between the ST and the TT. As shown in the example, the subject of the ST is '发达国家 (developed countries)' and the main verb is '加大 (scale up)'. '援助 (aid)' is the object of this segment. The modifiers of the object are made up of two parts: the prepositional phrase '对发展中国家的 (to developing countries)' and two adjectives '资金和技术 (financial and technological)'. If the interpreter wants to produce a successful interpretation, s/he cannot articulate a complete meaningful unit until s/he hears '资金和技术' and anticipate the head noun as help or support. Given the long modifier in this sentence, both groups of interpreters were found to articulate the filler after the modal verb, which means interpreters were obstructed after they finish the interpretation of '发达国家要 (developed countries should)'.

Example 4.28:

ST: 共建共享一个对所有妇女、对所有人更加美好的世界！ Gloss: together build together share one to all women, all people more beautiful de (particle) world. TT: build a better world for women and for all of us.	
Participants	SI
S3	We will *[em]* like to build a better future for women and girls.

The sentence structure in this example is very similar to the previous one. The modifier of the noun '世界 (world)' is composed of two parts: the prepositional phrase '对所有妇女、对所有人 (for women and for all of us)' and adjective '更加美好的 (better)'. The interpreter might not be able to anticipate the noun unless s/he listens to the end of the segment. Therefore, the syntactic difference poses a great challenge to memory storage. As shown in the SI, the filled pause occurred when the interpreter was preparing to articulate the segment.

Example 4.29:

ST: 中国妇女也将通过自身发展不断促进世界妇女运动发展，为全球男女平等事业作出更大贡献。 Gloss: China women also will through self development continuous promote world women movement development, for global men and women equality cause do more contribution. TT: Chinese women will also promote the global women's movement through their own development and make greater contribution to the cause of global gender equality.	
Participants	SI
S9	We will also help to promote the international women development and *[um]* to contribute more to the development of the women in the world.

The challenge of this sentence lies in the handling of the prepositional phrase. In Chinese, '为 (for/on behalf of)' is a preposition to indicate beneficiary or recipient (Ross & Ma, 2006, p.86) and can be combined with nouns to form a phrase. The prepositional phrase '为全球男女平等事业 (for the cause of global gender equality)' is added at the front to modify the verb '作出 (do)'. Therefore, the interpreter has to store this long phrase in his/her memory and to continue listening until the main verb appears. Without the main verb, the interpreter is not able to produce a meaningful unit.

4.3.3 Summary

Section 4.3 presented the analyses of filled pauses in English to Chinese and Chinese to English directions for both the student and the professional group.

Regarding the impact of directionality on filled pauses in SI, five categories of triggers were identified, namely conceptualising, information density, formulating, syntactic difference, and idiosyncrasies in the English to Chinese direction. In comparison, four categories of triggers except idiosyncrasies were found in the Chinese to English direction.

In the analysis of filled pauses due to conceptualising, it is noticed that filled pauses identified in this category in the English to Chinese direction are largely related to comprehension problems. Based on the discussion of Examples 4.1 and 4.2, the lack of knowledge of a certain culture and its language expression restricted understanding to some extent, which consequently caused comprehension problems. In the Chinese to English direction, since interpreters' A language is Chinese, the understanding of ST did not cause any problems. Instead, interpreters paid attention to the logic analysis towards the ST in their interpretation, as shown in Example 4.18.

When it comes to information density, the examples discussed in Sections 4.3.1.2 and 4.3.2.2 show that parallel structures require more processing capacity in both language directions, and interpreters tended to use the condensation strategy to cope with the increased processing load.

The difficulties in relation to formulating in both directions entail lexical retrieval of unknown names, as well as the process of searching for or improving a certain expression. The examples in Sections 4.3.1.3 and 4.3.2.3 show that when interpreters encountered unknown names, this caused many filled pauses in both directions. Nevertheless, as shown in Examples 4.10 and 4.22, a slight difference is that

interpreters seem to have been able to familiarise themselves with glossaries enough to successfully retrieve the unknown names in the Chinese to English direction, in contrast with the English to Chinese direction. As for searching for or improving a certain expression, interpreters' reflections showed that lack of a quick response and of availability of a certain word is a problem common to both interpreting directions.

Given the syntactic differences between English and Chinese, interpreters sometimes might not be able to anticipate the sentence structure, and filled pauses usually occur under this circumstance. In English to Chinese direction, interpreters need to use a salami technique to cope with the challenge, as shown in Examples 4.13 and 4.15, or change the negative form into a positive form, as in Example 4.14. The headword or the meaning unit is usually located at the very end of a segment in Chinese. Thus, it requires interpreters to either anticipate, as in Examples 4.27, 4.28 and 4.29, or wait until the headword appears. However, this needs interpreters to store the information temporarily and will pose a challenge to the coordination effort since interpreters also need to process the incoming messages simultaneously.

Regarding idiosyncrasies, it is interesting to notice that some professional interpreters prefer to use the filler word '那 (well)' at the beginning of their articulation in the English to Chinese direction but not vice versa. Often, this is closely related to personal language behaviour rather than potential problems. Moreover, this phenomenon is not attested among student interpreters, as student interpreters usually used filler sounds such as '嗯 (um)' in their interpretations. Given the result of filled pauses frequency between two groups, this might partly explain why the statistical difference is not significant in the English to Chinese direction.

4.4 Impact of directionality on repetition frequency in SI

This section focuses on the frequency analysis of repetition of the two interpreting groups in both directions. This is to determine how directionality influences the fluency level of each group from the perspective of repetition frequency. This is followed by an inter-group comparison in each direction to establish whether expertise is related to repetition frequency.

4.4.1 Repetition frequency: Student group

Table 4-32 below demonstrates the repetition frequency for each participant in this group.

Table 4-32 Repetition analysis: Student group

Participant	Interpreting direction	Total number of repetition (times)	Duration (minutes)	Frequency (times/minute)
S1	E to C	26	15.033	1.73
	C to E	18	11.217	1.605
S2	E to C	22	15.333	1.435
	C to E	19	11.217	1.694
S3	E to C	6	15.3	0.392
	C to E	14	11.2	1.25
S4	E to C	18	15.283	1.178
	C to E	27	11.15	2.422
S5	E to C	11	15.267	0.721
	C to E	8	11.267	0.71
S6	E to C	13	15.317	0.849
	C to E	7	11.067	0.633
S7	E to C	35	15.317	2.285
	C to E	1	11.117	0.09
S8	E to C	6	15.25	0.393
	C to E	8	11.117	0.72
S9	E to C	4	15.3	0.261
	C to E	6	11.233	0.534
S10	E to C	15	15.267	0.983
	C to E	9	11.283	0.798
Total	E to C	156	152.667	1.022
	C to E	117	111.868	1.046

According to Table 4-32, it can be noticed that the total number of repetitions in English to Chinese SI is 156, and the number in the other direction is 117. By screening through the repetition frequency, half of the participants have higher repetition frequency in the English to Chinese direction (S1, S5, S6, S7 and S10) and the other

half of the participants have higher repetition frequency in the other direction (S2, S3, S4, S8 and S9).

To answer the question of the impact of directionality on repetition frequency from the quantitative perspective, the following tests were conducted.

Table 4-33 Tests of normality: Repetition analysis in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C repetition frequency	.134	10	.200*	.940	10	.552
C to E repetition frequency	.240	10	.107	.929	10	.437

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 4-33 above shows the results of tests of normality in the student group, indicating that the data are normally distributed in both directions (sig >0.05).

Table 4-34 Paired-samples t-test: Repetition analysis in student group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C repetition frequency	1.02270	10	.648506	.205076
	C to E repetition frequency	1.04560	10	.690789	.218447

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C repetition frequency - C to E repetition frequency	-.022900	.909313	.287550	-.673383	.627583	-.080	9	.938

As shown in Table 4-34, the paired-samples t-test compared the repetition frequency in the English to Chinese direction and Chinese to English direction. There

was no significant difference in the scores for English to Chinese (M=1.02, SD=0.65) and Chinese to English (M=1.05, SD=0.69) directions; t(9)=0.080, p=0.938. These results suggest that directionality does not have an impact on the repetition frequency. Specifically, when students perform SI tasks in either direction, the overall repetition frequency does not increase or decrease with the change of direction.

4.4.2 Repetition frequency: Professional group

Table 4-35 below provides an overview of the total number of repetitions, interpreting duration, and its frequency in each direction.

Table 4-35 Repetition analysis: Professional group

Participant	Interpreting direction	Total number of repetitions (times)	Duration (minutes)	Frequency (times/minute)
P1	E to C	14	15.333	0.913
	C to E	6	11.167	0.537
P2	E to C	8	15.25	0.525
	C to E	5	11.083	0.451
P3	E to C	9	15.317	0.588
	C to E	3	11.233	0.267
P4	E to C	5	15.267	0.328
	C to E	7	11.15	0.628
P5	E to C	11	15.283	0.72
	C to E	8	11.15	0.717
P6	E to C	2	15.3	0.131
	C to E	1	11.167	0.09
P7	E to C	12	15.3	0.784
	C to E	9	11.117	0.89
P8	E to C	1	15.3	0.065
	C to E	4	11.217	0.357
P9	E to C	14	15.3	0.915
	C to E	12	11.183	1.073
P10	E to C	6	15.283	0.393
	C to E	6	11.083	0.541
Total	E to C	82	152.933	0.536
	C to E	61	111.55	0.547

The total number of repetitions in the English to Chinese direction is 82 with a frequency of 0.536, while in the Chinese to English direction it is 61 with a frequency of 0.547. From this table, no clear difference can be identified in terms of the repetition frequency in both directions.

Table 4-36 Test of normality: Repetition analysis in professional group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C repetition frequency	.127	10	.200*	.940	10	.557
C to E repetition frequency	.119	10	.200*	.989	10	.995

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

According to Table 4-36, the data are normally distributed in both directions (sig >0.05).

Table 4-37 Paired-samples t-test: Repetition analysis in professional group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C repetition frequency	.53620	10	.304327	.096237
	C to E repetition frequency	.55510	10	.290943	.092004

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C repetition frequency - C to E repetition frequency	-.018900	.231272	.073134	-.184342	.146542	-.258	9	.802

A paired-samples t-test was conducted to compare the difference in repetition frequency between English to Chinese and Chinese to English directions. Based on the results shown in Table 4-37, no significant difference was found in English to Chinese (M=0.54, SD=0.30) and Chinese to English (M=0.56, SD=0.09) direction; t(9)=-0.258, p=0.802. The results suggest that directionality is not a factor that influenced the repetition frequency of SI in the professional group.

4.4.3 Repetition frequency: Inter-group comparison

This section presents a comparison of repetition frequency between the student and professional group in order to determine the impact of expertise on repetition frequency.

4.4.3.1 Repetition frequency: English to Chinese direction

Table 4-38 shows the results of the normality test for the student group and the professional group in this direction.

Table 4-38 Tests of normality: Repetition analysis between two groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C repetition frequency	S	.134	10	.200*	.940	10	.552
	P	.127	10	.200*	.940	10	.557

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The results of tests of normality show that the data are normally distributed for both groups (sig >0.05).

Table 4-39 Independent t-test: Repetition analysis between two groups in English to Chinese direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
E to C repetition frequency	S	10	1.02270	.648506	.205076
	P	10	.53620	.304327	.096237

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
E to C repetition frequency	Equal variances assumed	4.244	.054	2.148	18	.046	.486500	.226534	.010570	.962430
	Equal variances not assumed			2.148	12.781	.052	.486500	.226534	-.003752	.976752

The independent t-test compares repetition frequency across the two groups in the English to Chinese direction. The results presented in Table 4-39 show the average

repetition frequency for the student group (M=1.02, SD=0.65) and for the professional group (M=0.54, SD=0.30). The difference was statistically significant; t(18)=2.148 and p=0.046. These results suggest that expertise has an impact on repetition frequency - in the English to Chinese direction, professional interpreters had fewer repetitions per minute than student interpreters.

4.4.3.2 Repetition frequency: Chinese to English direction

The results of tests of normality for the student group and the professional group in this direction are shown below in Table 4-40.

Table 4-40 Tests of normality: Repetition analysis between two groups in Chinese to English direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
C to E repetition frequency	S	.240	10	.107	.929	10	.437
	P	.119	10	.200*	.989	10	.995

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

The results of tests of normality show that the data are normally distributed for both groups (sig >0.05).

Table 4-41 Independent t-test: Repetition analysis between two groups in Chinese to English direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
C to E repetition frequency	S	10	1.04560	.690789	.218447
	P	10	.55510	.290943	.092004

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
C to E repetition frequency	Equal variances assumed	7.072	.016	2.069	18	.053	.490500	.237031	-.007484	.988484
	Equal variances not assumed			2.069	12.096	.061	.490500	.237031	-.025494	1.006494

The independent t-test compares repetition frequency across the two groups in the Chinese to English direction. The results presented in Table 4-41 indicate there was no significant difference in the scores for the student group and the professional group; $t(18)=2.069$, $p=0.053$. These results suggest little to no impact of expertise on repetition frequency in this direction.

4.4.4 Summary

To sum up, regarding repetition frequency, paired-samples t-test results for both groups indicate that directionality does not have an impact on repetition frequency. The mean repetition frequency in the English to Chinese direction is about the same as that in the Chinese to English direction and this applies to both student and professional groups. The results of the inter-group comparison show that the repetition frequency is lower in the professional group than in the student group in the English to Chinese direction. However, this finding is not borne out in the Chinese to English direction. This suggest that expertise influences repetition frequency in English to Chinese but not in the other direction.

4.5 Analysis of repetitions in SI

As discussed in Section 3.2.2.2, the different categories of repetitions include part-word repetition, whole-word repetition, and phrase repetition. According to
Table 4-32 and Table 4-35, the total number of repetitions in English to Chinese direction is 156 for the student group and 82 for the professional group and that in Chinese to English direction is 117 for the student group and 61 for the professional group. Table 4-42 below presents the percentage of repetitions for each category across the two groups:

Table 4-42 Distribution of repetitions

Group	Direction	part-word repetition (%)	whole-word repetition (%)	phrase repetition (%)
Students	E to C	45.51%	41.67%	12.82%
	C to E	49.57%	35.04%	15.38%
Professionals	E to C	42.68%	35.37%	21.95%
	C to E	47.54%	27.87%	24.59%

The table shows that in the English to Chinese direction, part-word repetition amounted to the highest percentage with 45.51% for the student group and 42.68% for professional group, followed by whole-word repetition and phrase repetition. In the Chinese to English direction, the same applied. When comparing the two groups, it can be observed that regardless of direction, the percentage of part-word repetition and whole-word repetition were lower in the professional group than in the student group, while that of phrase repetition were higher in the professional group than in the student group.

Subsections 4.5.1 and 4.5.2 below present detailed analyses of repetitions found in both groups in order to figure out the causes for repetitions in both directions.

4.5.1 Repetitions in the English to Chinese direction

4.5.1.1 Part-word repetitions

In the analysis of part-word repetitions, the following seven examples illustrate part-word repetitions that were identified in the corpora. The factors that triggered part-word repetitions in the English to Chinese direction include unknown names, numbers, parallel structures, and lexical comprehension and retrieval.

Examples 4.30 and 4.31 illustrate part-word repetitions triggered by unknown names.

Example 4.30:

ST: ...we saw the creation of UN Women...			
Participant	SI	Gloss	BT
P6	...也看到了*联-联*合国妇女署的变化...	...also saw *U-UN* Women de (particle) change...	...we also saw the change of *U-UN* Women...

The occurrence of repetition in this example is associated with the interpretation of the term 'UN Women'. The interpreter repeated the character '联' twice before providing the correct version of UN Women. This suggests that when interpreters are not familiar with a term, repetition could potentially offer interpreters more time to think of the correct expression.

Example 4.31:

ST: ...I have to say when I was Secretary of State...			
Participants	SI	Gloss	BT
P1	...我是*国-国*务院的秘书...	...I was *Sta-State* Department de (particle) Secretary...	...I was Secretary of the *Sta-State* Department...

This is an example of the repetition of part of the word '国务院 (State Department)'. According to the ST, the official translation of 'Secretary of State' in Chinese is '国务卿'. However, the interpreter made a literal translation and 'secretary' was directly translated into '秘书'. Though the character '国' was repeated twice, the interpreter still failed to quickly link this phrase with the Chinese expression.

The interpretation of numbers is always a challenge for interpreters in the English and Chinese language combination. The following two examples illustrate the challenge of converting number units from English to Chinese as well as the difficulty when a number and a term are combined together.

Example 4.32:

ST: ...but more than 30 million girls...			
Participant	SI	Gloss	BT
P2	...但是还有三-三千万的女孩...	...but also *three-three* thousand ten-thousands de (particle) girls...	...but also *thir-thirty* million girls...

In Example 4.32, the repetition is related to the interpretation of the number. The interpreter repeated '三' twice and it is very likely that the interpretation of '30 million' required more efforts as the interpreter needed to convert the unit from million to ten million in Chinese. With the help of repetition, interpreters managed to convert the unit and interpret it successfully.

Example 4.33:

ST: Now, some of you, as I gaze out, were with me in Beijing back in 1995 (a) at the fourth World Conference on Women (b)...			
Participant	SI	Gloss	BT
S2	我在一[呃]一九九五 (a) 年在北京的时候...	I in *one* [um] *one* nine nine five (a) year in Beijing de (particle) time...	When I was in Beijing in *1[um]1*995 (a)...
S7	[那]有一些人可能[呃][呃]在一九九九年，[呃]当时呢在[呃]第四届妇女地位*委-委*-[这个][呃]妇女大会 (b) 上呢...	[Well] have some people might [um] [um] in one nine nine nine year, [um] at that time ne (particle) at [um] the fourth Women Status *Com-Com*-[well] [um] Women Conference (b) on ne (particle)...	[Well] Some people might [um] [um] in 1999, [um] at that time at [um] the fourth Women Status *Com-Com*-[well] [um] Conference on Women (b)...
P5	那么在一九九五年呢，当时[呃]*第第*一次世界妇女大会 (b) 在北京举行...	Then in one nine none five year ne (particle), at that time [um] *the the* first World Women Conference (b) in Beijing held...	Then in 1995, at that time [um] *the the* first World Conference on Women (b) was hold in Beijing...

In S2's interpretation, the interpreter repeated the number '1' twice and it is interesting to notice that there is a filler between the repetition. This showed that the interpreter might have encountered a problem when s/he interpreted the year.

In comparison with the repetition in S2's interpretation, repetition that occurred in S5 and P5's interpretation relates to the translation of 'the fourth World Conference on Women'. From S5's articulation, it seems that the interpreter wanted to express the idea of committee in Chinese, which is the reason why s/he repeated the part of the committee twice before providing the correct translation. In P5's interpretation, it seems at first glance that this is a whole-word repetition based on the gloss and BT as the word 'the' was repeated twice. However, '第一 (the first)' in Chinese is counted as an ordinal number and it is made up of the prefix '第' and a number (Ross & Ma, 2006, p.32). In fact, 'the fourth' alone should not pose any difficulty to the interpreter and the reason is likely to be that two numbers, i.e., 1995 and the fourth, occurred in a short time. According to the interpreter's recollection, s/he started the interpretation when s/he heard 1995 and did not anticipate that there would be another number following, which caused him/her to forget which conference it was. Therefore, it is not surprising to find a repetition in his/her interpretation as s/he was uncertain if it was the first or the fourth conference.

As with filled pauses identified in the corpora caused by lexical retrieval and comprehension, the familiarity of language use and lexical retrieval in a short time also pose challenges for interpreters.

Example 4.34:

ST: We can't afford to leave any talent on the sidelines.			
Participant	SI	Gloss	BT
S3	那么我们就不可以为一些性别来*设-设*限。	Then we can not for some gender to *se-set* limitation.	Then we cannot *se-set* limitations for some gender.

In this example, the interpreter repeated the character '设', which reflected his/her thinking process of finding an equivalent expression for the phrase 'leave on the sidelines'. The interpreter reflected that when s/he heard the 'sidelines', his/her

understanding of the sentence was that talented women cannot be put aside and not be allowed to participate in some activities because of the gender issue. Therefore, the repetition of '设' gave the interpreter some time to decide the word s/he would like to use to complete this sentence.

Example 4.35:

ST: ...laws have to be backed up with resources and political will with prosecutors and police officers and judges...			
Participant	SI	Gloss	BT
S4	...不管是法官还是*政-政*治人员...	...no matter be judge or *po-political* people...	...no matter they are judges or *political* people...
S7	...[嗯]*法-法*官、[呃]*警-警-警*员等等...	...[um] *ju-judges,* [um] *po-po-police* officers...	...[um] *ju-judges,* [um] *po-po-police* officers and so on...

In the analysis of filled pauses in Section 4.3, it is pointed out that a parallel structure of noun or noun phrase will cause a high information density, which triggers filled pauses in SI. On top of filled pauses, the example shown above demonstrates that the challenge caused by high information density with a series of nouns can also be manifested by several repetitions in interpretations. In S4's interpretation, it can be observed that the interpreter did not start the articulation until s/he listened to the word 'judges'. S/he produced the interpretation of this word first, followed by a repetition of 'political'. According to the ST, it is obvious that the interpreter did not explicitly provide the interpretation of both 'prosecutors and police officers'. The reason why it was interpreted into 'political' is because the interpreter caught the word 'political' and 'officers' respectively and combined the meaning of these two words. As for S7's interpretation, the interpreter managed to interpret the meaning of 'judges' and 'police officers' with a part-word repetition respectively. Both of the interpreters missed the interpretation of 'prosecutors'. According to their recollections, they knew the meaning of all the words in English, but when they listened to these words in a

sequence, they were not able to provide an interpretation in a short time. This is especially true for 'prosecutors' as the interpreters reflected that these words did not appear frequently in their daily use and they were only able to retrieve the words that they were more familiar with.

Example 4.36:

ST: ...particularly in the formal business sector...			
Participant	SI	Gloss	BT
S6	...尤其是*重*-[嗯] *重*要的商业领域...	...especially be *import*-[um] *important* business sector...	...especially in *import*-[um] *important* business sector...

As shown in the example above, the character '重' was repeated twice when the interpreter wanted to express the meaning of 'formal'. It can be observed from the interpretation that the interpreter struggled with the comprehension of 'formal business sector'. In fact, formal sectors refer to "a group of people, usually employees, that includes recognized income sources for paying income taxes based on all 40-hour, regular wage jobs" (The Law Dictionary, n.d.) and it contrasts with the informal sector. Therefore, the equivalent translation of 'formal' in Chinese is '正规'. It is obvious that the meaning of 'important' deviates from 'formal'. The repetition might show that the interpreter endeavoured to provide a more accurate interpretation, but s/he failed to think of one and had to repeat to try to provide a complete meaning.

4.5.1.2 Whole-word repetitions

Similarly to part-word repetitions, whole-word repetitions also appear frequently in the corpus of both groups in the English to Chinese direction.

As discussed in the analysis of filled pauses, syntactic difference will pose challenges as interpreters need to reorganise the sentence structure to formulate an expression that conforms to the language use of the target audience. It is found in the corpora that repetition is also a manifestation of problems triggered by syntactic difference.

Example 4.37:

ST: We know that the only way to achieve broad-based growth and prosperity in a competitive and interdependent world is to build economies and societies that work for everyone and include everyone.			
Participant	SI	Gloss	BT
S1	[嗯]*为为*实现富强平等的社会，我们需要每个人去参与其中。	[um] *To to* achieve prosperous equal society, we need everyone to participate in.	[um] *To to* achieve a prosperous and equal society, we need everyone to participate in.
P2	*在*[嗯]*在*独立的世界中，实现繁荣是需要每个人都参与进来的。	*In* [um] *in* independent world, in achieve prosperity is need everyone all participate in.	*In* [um] *in* an independent world, achieving prosperity needs everyone to participate in.

The underlined segment displays the syntactic difference when it is interpreted into Chinese. In Chinese order, the meaning units need to be translated in a segmented sequence of "in a competitive and interdependent world / to achieve broad-based growth and prosperity / the only way". This example shows that both interpreters repeated the preposition, which is located at the beginning of their interpretation and is also the place where they segmented the meaning unit. The difference between the student interpreter and the professional interpreter is that the student interpreter started the articulation when s/he heard "to achieve broad-based growth and prosperity", while the professional interpreter waited until the speaker said "in a competitive and interdependent world". In a comparison of their interpretations, the professional interpreter can better cope with the challenge of syntactic difference and managed to cover the overall meaning, but at the same time it requires the interpreter to have a long EVS and to store a certain amount of information in memory. As for the student interpreter, s/he had a short EVS and followed the original ST closely, which restricted his/her ability to add the information of the prepositional phrase based on the current sentence structure.

The next three examples are associated with repetitions caused by lexical retrieval due to the shortage of available expressions or language expressions.

Example 4.38:

ST: ...we zero in on the continuing gaps affecting gender.			
Participant	SI	Gloss	BT
S2	...*我们我们*需要把男女差异尽量缩小。	...*we we* need ba (function word) men women gap try to narrow.	...*we we* need to try to narrow the gender gap.
S8	...所以我们要*保证保证*缩短性别中的差异，缩小性别中的差异。	...so we need *guarantee guarantee* shorten gender in de (particle) gap, narrow gender in de (particle) gap.	...so we need to *guarantee guarantee* to shorten the gap in gender, narrow the gender gap.

Both interpreters in this example expressed that they were unfamiliar with the expression "zero in". Based on the context, they guessed it might have the same meaning as "narrow". As can be seen from their interpretation, S2 repeated the subject "we" twice in Chinese and S8 repeated "guarantee" in Chinese twice, which showed that both interpreters were likely to have hesitation and uncertainty on producing the message in Chinese to some degree.

Example 4.39:

ST: There was a moment when I often saw their eyes glaze over...			
Participant	SI	Gloss	BT
S4	...我们知道他们眼神*会会*呆滞一阵子...	...we know they eyes *can can* dull a period of time...	...we know they *will will* have a dull stare for a while...

In this example, the interpreter repeated "can" twice before expressing the meaning of the phrase "glaze over". This phrase has a meaning that the listeners are bored or are thinking about something else so that their eyes become dull. The repetition showed that the interpreter was likely to be unfamiliar with this phrase but managed to predict the meaning based on the context. With the help of repetition, s/he could quickly think about the meaning of the phrase.

Example 4.40:

ST: ...women and girls have a much greater chance to live healthy and secure lives.			
Participant	SI	Gloss	BT
S10	...她们都可以生活一个更加健康*更加*[嗯]*更加*安全的环境。	...they all can live a more healthy *more* [um] *more* secure environment.	...they all can live in a healthier and *more* [um] *more* secure environment.

The repetition "更加 (more)" in the interpretation occurred prior to the adjective phrase. Both adjectives "healthy and secure" are easy to understand and should not pose any challenge regarding lexical retrieval. However, the occurrence of repetition shows that when two adjectives appear together, the interpreter might not be able to retrieve the target expression quickly. Another reason which might lead to the repetition is that the interpreter's effort was distracted by other information. Given the interpreter's recollection, when s/he interpreted this sentence, his/her attention did not purely focus on this part as s/he was still thinking about the comparative sentence structure in the previous sentence.

4.5.1.3 Phrase repetitions

Compared with part-word and whole-word repetitions, phrase repetitions only occupy a small number in the whole category of repetitions for both groups in the English to Chinese direction. Also, the percentage of phrase repetitions for the professional group is higher than that for the student group. The selected examples below elaborate the situation under which phrase repetitions occurred, as well as potential reasons.

Example 4.41:

ST: I'm excited by where we are, and particularly that we have brought in so many businesses who understand the role that they can play.			
Participant	SI	Gloss	BT
S5	我非常激动，我们现在的*成就已经如此成就已经如此*之高，但是我们还要认识到商界领导的能力。	I very excited, we now de (particle) *achievement already such achievement already such* high, but we also need realise business leader de (particle) ability.	I'm very excited, and we've *already achieved such already achieved such* great accomplishments, but we also need to realise the ability of business leaders.
P9	我们现在取得的成就是很好的，尤其是我们今天*又有又有*更多的人参与到这样的行动当中。	We now achieved accomplishment is very good, particularly is we today *again have again have* more people participate in such action in.	The accomplishments we've achieved so far are great, particularly we *also have also have* more people to participate in this action.

Both interpreters were found to have repetitions within the same sentence but in different segments. The repetition identified in the student interpreter is related to the sentence 'I'm excited by where we are', which refers to the achievements that have already been obtained based on the context in the original ST. In S5's interpretation, s/he used two separate sentences to interpret, and the repetition occurred when s/he processed 'by where we are'. Based on what s/he said in Chinese, the trigger lies in the adjective that can be used to collocate with the achievements. Therefore, s/he repeated the phrase twice and finally decided to use 'high'. Based on the place of the repetition found in the professional interpreter's articulation, it is likely to be related

to the interpretation of ‘so many businesses who understand the role that they can play’. The interpreter reflected that s/he did not clearly remember hearing ‘businesses’ but hearing ‘brought in’ clearly, so s/he could probably have more time to think how to link the two chunks in a natural way through repetition.

Example 4.42:

ST: I think it’s fair to say we are here to build on the progress of the past and seize the promise of the future.			
Participant	SI	Gloss	BT
S2	我觉得我们可以说我们在这里*是想是想*实现我们之前许下的承诺。	I think we can say we at here *is want is want* realise we before made promise.	I think we can say we are here today *is in hope of is in hope of* realising the promise we made.

In this example, after the student finished the interpretation of ‘we are here’, the repetition appeared. The interpreter expressed that the appearance of repetition is linked to two factors. First, s/he found it difficult to express the meaning of the structure ‘it’s fair to say’ in Chinese in a literal way as this did not comply with the language habit. Therefore, s/he started struggling with the interpretation, which directly led to the information loss in hearing as s/he only managed to catch the word ‘promise’. Due to this reason, s/he repeated ‘是想 (is in hope of)’ to complete the meaning of the infinitive clause underlined in the ST.

Example 4.43:

ST: ...our economy would grow by nearly 10%, and the numbers are significant for other economies as well.			
Participant	SI	Gloss	BT
S2	...*我们的经济，我们的经济就会就会*与其他的经济体产生巨大的差距。	...*our economy, our economy then can then can* and other economy produce significant gap.	...*our economy, our economy then would then would* have a significant gap with other economies.

The student interpreter had a repetition of two phrases, which are '我们的经济 (our economy)' and '就会 (then would)', meaning 'our economy' and 'then would' respectively. As can be seen from the ST, the chunk 'our economy would' is followed by a number, which is also associated with the second sentence in meaning. Through the examination of the interpreter's reflection, the interpreter reported that she caught the information 'our economy would' and then started interpretation. Due to the reason that s/he put all his/her efforts into the interpretation of this section, s/he did not pay attention to the rest of the message in this sentence, which led to information loss. After s/he finished the interpretation of this phrase, the next message s/he heard was 'other economies'. That is the reason why s/he repeated the phrases twice.

Example 4.44:

ST: And let's keep working until we can finally say the unfinished business of the 21st century is done.			
Participant	SI	Gloss	BT
S6	让我们继续努力，让我们最终可以说*二十一世纪二十一世纪*的任务已经完成了。	Let us keep effort, let us finally can say *two ten one century two ten one century* de (particle) task already complete le (particle).	Let us keep working, let us finally say the task of *the 21st century the 21st century* is done.
P7	希望我们终有一天能够说*二十一世纪的二十一世纪的*伟大的目标已经完成了。	Hope we finally have one day can say *two ten one century de (particle) two ten one century de (particle)* great goal already complete le (particle).	Hope we can finally say in one day the great goal in *the 21st century the 21st century* is done.

Example 4.44 shows both the student interpreter and the professional interpreter repeat the phrase '21st century', which is '二十一世纪' in Chinese. Both interpreters recalled that when it came to the end of the speech, they were eager to finish the interpretation since the speaker had already finished. They did not have too much time to think about how to interpret 'unfinished business'. Under the pressure of time and meaning completeness, they repeated this phrase twice and finally completed the sentence.

Example 4.45:

ST: Take the United States...			
Participant	SI	Gloss	BT
P5	*比如说美国，以美国为例*...	*Such as say the United States, take the United States as example*...	*Such as the United States, take the United States as an example*...

In the analysis of criteria of repetitions in Section 3.2.2.2, it is mentioned that synonym is also counted as a repetition as the meaning is similar. Through the analysis of the corpora, this phenomenon was found in the interpretation of an interpreter from the professional group. As shown in the example, the interpreter said '比如说美国 (such as the United States)' first and then changed the expression to '以美国为例 (take the United States as an example)'. Both expressions have the same meaning. In the retrospection, the interpreter only noticed his/her repetition after listening to the recording but cannot remember clearly why s/he did it. Based on the recollection, even though it is not possible to find out the exact reason for his/her repetition, what can be concluded from this case is that the interpreter paid full attention to the interpreting process and had an unconscious repetition but was unable to realise it due to the limited cognitive effort.

4.5.2 Repetitions in the Chinese to English direction

As mentioned earlier, in the Chinese to English direction almost half of the repetitions are part-word repetitions (49.57% for student interpreters and 47.54% for professional interpreters), followed by whole-word repetitions (35.04% for student interpreters and 27.87% for professional interpreters) and phrase repetitions (15.38% for student interpreters and 24.59% for professional interpreters). In comparison with student interpreters, the percentage of both part-word repetitions and whole-word repetitions was lower but the percentage of phrase repetitions was higher in the professional group.

4.5.2.1 Part-word repetitions

The examples illustrate the possible causes that trigger part-word repetitions in the Chinese to English direction. The evidence collected from the corpora shows that part-word repetitions are mainly caused by numbers, unknown words, and lexical retrievals.

The following three examples illustrate repetitions related to numbers.

Example 4.46:

ST: 全球 143 个国家通过立法明确规定男女平等...
Gloss: Globe one hundred and forty-three countries through legislation explicit rule man woman equality...
BT: A hundred and forty-three countries have enshrined gender equality in their laws...

Participant	SI
S1	One hundred and *for-forty*-three countries have given *po-power* to women...

There are two part-word repetitions in this example: 'forty-three' and 'power'. For the first repetition, it seems that the interpreter had a problem with a split of attention. When s/he interpreted the number, s/he was influenced by a chunk in the previous sentence '遥不可及的梦想 (dreams that were once beyond reach)' and did not have enough effort to interpret the number smoothly. As for the second repetition, even though it is not related to number, according to the interpreter's recollection, it still reflects the difficulty in production in the Chinese to English direction. The interpreter thinks it is not easy to come up with a good expression for '通过立法明确规定 (have enshrined ... in their laws)' and what s/he can produce is to 'give power to women' but with hesitation about the expression.

Example 4.47:

ST: 从 200 多年前世界第一份妇女权利宣言诞生...
Gloss: From two hundred more years ago world the first woman right declaration birth...
BT: From the publication of the Declaration of the Rights of Woman over two hundred years ago...

Participant	SI
S2	Since *t-two* hundred years ago, [um] the first Declaration of the Rights of Woman...

This example also shows a part-word repetition, which is ‘two hundred years ago’. Given the fact that ‘two hundred’ is not difficult to translate from Chinese into English, the potential reason for the occurrence repetition lies in the phonological encoding when the interpreter heard the number. Taking the context into consideration, there is a term (Declaration of the Rights of Woman) in this sentence, followed by a series of terms, including the International Women’s Day, the Commission on the Status of Women and the Convention on the Elimination of All Forms of Discrimination Against Women, so the interpreter would face cognitive saturation from the time when s/he interpreted the number.

Example 4.48:

ST: 落实 2015 年后发展议程相关目标。 Gloss: Implement 2015 year after development agenda relate goal. BT: the realisation of related goals in the Post-2015 Development Agenda.	
Participant	SI
S3	achieve the goals for *f-five*-year goals.

In this example, the repetition identified in the interpretation is not related with the interpretation of terminology, but the year. As shown above, the interpreter repeated the consonant ‘f’ and interpreted the year into five instead of 2015. According to the retrospective interview, the interpreter said:

> “I can remember I vaguely heard a year, followed with the achievement of goals. The next sentence I heard also had a number ‘five’. When I interpreted and listened at the same time, my current interpretation was influenced by the incoming message and I was prone to mixing them up”. (S3)

Based on the interpreter’s description, it is not surprising that the interpreter merged the meaning of two sentences as the interpreter herself was not sure which number matched with which information and if the number was correctly interpreted.

The following two examples demonstrated repetitions in relation to unknown words such as fixed expression or terminology.

Example 4.49:

ST: 尊敬的姆兰博努卡主任, Gloss: Distinguished Mlambo-Ngcuka Director, BT: Your Excellency Executive Director Phumzile Mlambo-Ngcuka,	
Participant	SI
S3	E-Excellency Executive director Mambo-Boka,

In official speeches, it is very usual to use 'your excellency' to address a person in diplomatic circumstances. Due to the unfamiliarity of such an expression, phonological error might occur, as shown in the Example 4.49. The interpreter repeated the vowel 'e' in the word 'excellency'.

Example 4.50:

ST: 《行动纲领》... Gloss: Action Platform... BT: Platform for Action...	
Participant	SI
S8	*Plat*-[em] *Platform* for Action...

Similar to Example 4.49, 'Platform for Action' is a term which caused not only repetition of part of the word 'platform' but also a filled pause in this case. It showed that unknown words brought certain challenges in interpreting and both filled pauses and repetitions are the manifestation of such a challenge.

Apart from the repetitions caused by numbers and unknown words, lexical retrieval is also the major reason that causes repetitions. On top of this, interpreters experienced difficulties retrieving polysyllabic content words; such a phenomenon was not found in the English to Chinese direction given that Chinese is a highly analytical language with predominantly monosyllabic words and fewer forms of parts of speech in content words. This is illustrated by the examples below.

Example 4.51:

ST: ...为促进男女平等... Gloss: ...for promote man woman equality... BT: ...to promote gender equality...	
Participant	SI
S2	...to fight for *e-equality* of men and women...

In this example, the word 'equality' is divided into four syllables and the interpreter was found to repeat the vowel located at the beginning. In the examination of the corpora and their retrospective interviews, it was found that interpreters sometimes needed to take some time to think about the attribute of a word, i.e., whether it is an adjective or a noun. In this case, it is 'equal' and 'equality'. Though the interpreter only articulated the vowel at the beginning, s/he used the repetition to determine the correct form of the word.

Example 4.52:

ST: ...推动广大妇女参与经济社会发展。 Gloss: ...promote all woman participate economy society development. BT: ...raise their participation in the process of social and economic development.	
Participant	SI
S10	...to encourage women to encoura- to participate in those work in the *socie-societal* action activities.

In the ST, the speaker mentioned the word '社会 (society)'. Since it is in collocation with '发展 (development)', the correct expression is social development. The interpreter commented that s/he wanted to use 'social' but unconsciously articulated part of the pronunciation of the noun form. S/he realised it in the middle of his/her interpretation and continued the interpretation by repeating the first two syllables and ended up with 'societal'.

Example 4.53:

ST: ...使妇女成为政界、商界、学界的领军人物。 Gloss: ...make woman become politics, business, academia de (particle) leader people. BT: ...and support them in becoming leaders in the fields of politics, business and academia.	
Participant	SI
S3	...[um] make them become the leaders of politics, business and *aca-academics*.

It was discussed earlier that a series of nouns/noun phrases will pose challenges to interpreters. In the ST, there are three nouns - politics, business and academia. The interpreter had a filled pause in his/her articulation but managed to provide the correct interpretation for the first two nouns. When it came to the third one, s/he had a repetition and interpreted it as 'academics'. S/he commented that for this part, s/he needed to speed up and quickly processed the information, but in general, the difficulty level for processing information was high.

Example 4.54:

ST: ...到通过《消除对妇女一切形式歧视公约》... Gloss: ...to through eliminate to woman all form discrimination convention... BT: ...to the adoption of the Convention on the Elimination of All Forms of Discrimination Against Women...	
Participant	SI
S4	...and then the Convention on the *Elimina-Elimination* of All Forms of Dicrimina-Discrimination Against Women was born...
S9	...to the publication of the Convention on the Elimination of All Forms of *Di-Discrimination* Against Women...
P1	...and also on the Convention on the *E-Elimination* of All Forms of Discrimination Against Women...

The words that were found to cause repetition include 'elimination' (S4 and P1) and 'discrimination' (S9). Both words have five syllables. Given the time constraint, interpreters are very likely to have problem with words such as these two. In SI, polysyllabic words require time for response if interpreters cannot speak them out smoothly. For example, S4 even made a phonological error by pronouncing it as 'dicrimina' and changed it into the correct pronunciation. S4 commented that though a Chinese phrase might be composed of a few characters, it is likely to be a long chunk if it is translated into English. When s/he processed this information, s/he had difficulty in pronouncing the word, which made him/her work under pressure.

Example 4.55:

ST: ...在联合国成立 70 周年... Gloss: ...at United Nations establish 70 anniversary... BT: ...On the occasion of the 70th anniversary of the founding of the United Nations...	
Participant	SI
S5	...At this seventy seven *anni-anniversary* of UN...

In this example, the interpreter repeated two syllables at the beginning of the word 'anniversary', and the interpreter expressed that the reason that triggered this repetition was because s/he forgot how the expression was expressed due to the infrequent use of this word in his/her vocabulary.

Example 4.56:

ST: ...没有妇女解放和进步... Gloss: ...no woman emancipation and progress... BT: ...without women's liberation and progress...	
Participant	SI
S6	...without the progress of women and *emanci-emancipation* of woman...

'解放 (emancipation/liberation)' is also an obstacle in the interpretation. According to what S6 provided, the interpreter had a problem with the pronunciation of this word. S/he reported that this word has so many syllables and it is not easy to pronounce. Besides, it took him/her a long time to think about the equivalent expression of '解放' in English because this word is not so frequently used either.

4.5.2.2 Whole-word repetitions

Whole-word repetitions in the Chinese to English direction occupied the second largest proportion among three categories of repetitions, with 35.04% for the student group and 27.87% for the professional group. The following examples selected from the

corpora cover problems such as numbers, syntactic difference, lexical retrieval, and unknown names which cause repetition.

Example 4.57:

ST: 现在全球 8 亿贫困人口中，一半以上是妇女。 Gloss: now globe eight a hundred million poverty people in, one half above is woman. BT: Women account for more than half of the 800 million impoverished population of the world.	
Participant	SI
S6	*Of of* eight hundred million people in the world, women are always have been the targets of wars and conflicts.

From the interpretation shown above, it can be seen that the preposition 'of' was repeated twice. Apart from this, the interpreter omitted the information 'more than half of them are women'. Instead, s/he continued the interpretation by providing the information of the incoming message. The difficulty of this sentence is that there are two numbers, i.e., eight hundred million and more than half, among which eight hundred million can cause the saturation of the interpretation. As discussed in the previous example 4.32, '30 million' involves a unit conversion from 'million' to 'ten million' from English to Chinese. This also applies to this example. In literal translation, '8 亿' means 'eight a hundred million' and the interpreter needs to convert the basic unit from 'a hundred million' to 'million' from Chinese to English. Through the repetition, the interpreter successfully provided the correct number in English.

The following example demonstrates repetitions related to syntactic difference.

Example 4.58:

ST: ...帮助她们适应社会和就业市场变化。 Gloss: ...help them adapt to society and career market change. BT: ...to help them better adapt to changes in society and the employment market.	
Participant	SI
S4	...and ensure that *they they* can [um] adjust to the changes of society.
P10	...to get them better equipped for *their their* development of their career.

Both of the interpreters were found to have a repetition of 'they' and 'their' in their interpretations respectively. The student interpreter produced the information of 'the changes in society' while the professional interpreter covered the idea 'their development of their career'. Part of the information was missed in their interpretations. In the original message, '社会和就业市场 (society and the employment market)' is the modifier of the head noun '变化 (changes)'. When it is translated into English, the head noun 'changes' needs to be put first. Without listening to the very end of this sentence, it is not always possible to anticipate the head noun. Both interpreters used repetition as a way to determine the sentence structure and reorganise the expression.

The following three examples show the problems of lexical retrieval as interpreters used repetition to buy more time to think about the appropriate expression.

Example 4.59:

ST: 为支持全球妇女事业... Gloss: For support global women cause... BT: To support women's development worldwide...	
Participant	SI
P9	In support of *women's women's* empowerment...

In this example, the interpreter struggled with the word '事业 (cause)'. As shown in his/her articulation, the interpreter repeated 'women's' twice before providing the

word ‘empowerment’. Based on the comparison between ‘empowerment’ and ‘cause’ in meaning, there is a deviation.

Example 4.60:

ST: ...妇女生存发展环境不断优化。 Gloss: ...Women existence development environment continuous optimisation. BT: ...and the social context for women’s life-quality and development is improving.	
Participant	SI
S4	...and women’s [uh] environment [um] is *has has* undergone great changes.
P7	...and women’s status and development *have have* improved.

Both interpreters were found to have a problem with the expression ‘优化 (optimise/improve)’, which is manifested as the repetition of part of the verbal phrase ‘has has undergone’ and ‘have have improved’ respectively. According to the professional interpreter’s comment, given the time constraint, it was not possible to interpret every single word, as translation intends to do. Based on the context, s/he said what President Xi expressed here was to show the positive effect. Therefore, the available word in their mind is a general one but is widely used. As for the student interpreter, s/he mentioned that s/he had a problem of interpreting half of the information while omitting the other half of the information in SI. Since s/he had met a problem when interpreting ‘the social context for women’s life-quality and development’, s/he decided to use the available word in order not to miss more information.

Example 4.61:

ST: ...发挥妇女“半边天”作用... Gloss: ...develop woman “half of sky” function... BT: ...give play to women’s important role as “half the sky”...	
Participant	SI
P1	...Chinese women *will will* [um] develop woman rights in their country...

‘半边天 (half of sky)’ is a phrase with specific Chinese characteristics, which shows the power and status of women as well as explicitly portraying a good image of Chinese women. In the retrospective interview, many interpreters, regardless of professional or student status, reported that they frequently heard this expression on some occasions but were not sure about the equivalent English expression. From P1’s interpretation, s/he used ‘will’ twice, followed with a filled pause before s/he expressed the idea ‘half of sky’. As reported by the interpreter, this phrase cost him/her some time to think about the expression in English. This clearly shows that expressions with Chinese characteristics, such as the one mentioned in this example, are an obstacle for interpreters. To maintain the completeness of the sentence, s/he finally interpreted into ‘develop woman rights in their country’.

Example 4.62:

ST: ...潘基文秘书长发起的“他为她”的倡议... Gloss: ...Ban Ki-moon Secretary-General launch de (particle) “He for She” de (particle) Initiative... BT: Secretary-General Ban Ki-moon’s “He for She” Initiative...	
Participant	SI
P10	...the “He for She” Initiative initiated *by by* Secretary-General Ban Ki-moon...

This example elaborated the interpreter’s difficulty in interpreting the title ‘Secretary-General’. Based on the interpretation, the preposition ‘by’ was repeated two times before s/he articulated ‘Secretary-General Ban Ki-moon’.

4.5.2.3 Phrase repetitions

This section presents three examples of phrase repetitions in the Chinese to English direction which were analysed from the perspectives of problems in interpreting numbers and lexical retrieval.

Example 4.63:

ST: 联合国妇女署做了大量工作，值得充分肯定。 Gloss: UN Women done lots of work, worth full sure. BT: UN Women should be fully recognised for the tremendous work it has done.	
Participant	SI
P9	This we've seen a great work done by UN Women and *we should we should* appreciate that.

The interpreter articulated 'we should we should' before continuing his/her interpretation. In the ST, the equivalent information that the interpreter processed is '值得充分肯定 (should be fully recognised)' and the problem lay in how to express '肯定 (recognise)'. After repetition, the interpreter used 'appreciate', which is similar to the idea expressed by the ST.

Example 4.64:

ST: 每当战乱和疾病来袭，妇女往往首当其冲。 Gloss: Every when war and disease come, woman usually be the first to bear the brunt. BT: They tend to bear the brunt of wars and epidemics.	
Participant	SI
P7	Where there is warfares, women always *take the take the* brunt.

When delivering the message, the speaker used a four-character Chinese idiom, which is underlined in the ST. This phrase means 'bear the brunt'. In Chinese official speeches, the use of four-character Chinese idioms is not an uncommon thing and it is

one of their stylistic features. Through the examination of the Chinese ST used as the experiment material in this study, the use of Chinese idioms can be found. The interpreter repeated 'take the' twice and successfully interpreted the meaning.

The final example in this section continues to further discuss the interpretation of numbers, as discussed in other sections.

Example 4.65:

ST: 中国将向妇女署捐款 1000 万美元...	
Gloss: China will to UN Women donate one thousand ten thousand US dollar...	
BT: China will donate US$10 million to UN Women...	
Participant	SI
S9	China *will donate* [uh] *will donate* one hundred billion US dollars...
P4	China will donate *a hun-a hundred* million US dollars to the United Nations...
P10	Now *we are we are* con-donate ten million US dollars to the UN...

Three interpreters were found to have a problem with the interpretation of the number '1000 万 (10 million)' as listed above. S9 and P10 showed a similar phenomenon, that the repetition of subject and/or predicate occurred before the interpretation of the number, while P4 had a direct repetition of the number. Due to the need of unit conversion between Chinese and English, the number '1000' and the number unit '万 (ten thousand) need to be converted to '10' and '百万 (million)' respectively. It can be seen from the interpretation that only P10 managed to convert the unit correctly. S9 interpreted it into 'one hundred billion', which means '1000 亿 (one thousand one hundred million in literal translation)'. P4's interpretation is 'a hundred million', which is equal to '1 亿 (one one hundred million in literal translation)'.

4.5.3 Summary

Section 4.5 presented the analyses of three categories of repetitions, namely part-word repetitions, whole-word repetitions and phrase repetitions, in the English to Chinese and Chinese to English directions for both student and professional groups.

Based on the quantitative analysis conducted in Table 4-42, part-word repetitions occupied the largest percentage, followed by whole-word repetitions, and only a small number of repetitions were found to be phrase repetitions. Such a trend applies to both groups of interpreters in both directions. As mentioned in the discussion of simultaneity in Section 1.2, the time constraint in SI means that decisions such as word choices and sentence structures have to be made by interpreters in a very short time. Independently of whether they are part-word repetitions or whole-word repetitions, these types of repetitions usually occur within seconds. In comparison, phrase repetitions are usually in a relatively long chunk and consume too much time in SI. Therefore, it is understandable why there would be more word repetitions than phrase repetitions.

Regarding part-word repetitions, both groups of interpreters showed a higher percentage of repetitions in the Chinese to English direction compared with the other direction. Problems such as unknown names, numbers, and lexical comprehension and retrieval were found to be the major triggers in both English to Chinese and Chinese to English directions. For instance, unknown names such as UN Women (Example 4.30) and Secretary of State (Example 4.31) in English to Chinese, and Your Excellency (Example 4.49) and Platform for Action (Example 4.50) in Chinese to English posed challenges to interpreters. Regarding numbers, most of the interpreters used repetitions to gain more time to consider the correct expression in both directions because of number conversion across the two languages. In terms of lexical comprehension and retrieval in the English to Chinese direction, due to the unfamiliarity with language usage or certain expressions in English given the different cultural backgrounds, interpreters needed to spend more efforts understanding the meaning. For example, ‘formal business sector’ in Example 4.36 illustrates this point. In comparison, what made interpreters struggle in the Chinese to English direction is the pronunciation of polysyllabic words, and repetitions that occurred were found to be related to this when they retrieved the word.

The percentage of whole-word repetitions in both groups was lower than that of part-word repetitions in both directions. Unlike part-word repetitions, both groups of interpreters tended to have more whole-word repetitions in the English to Chinese direction than in Chinese to English. In the English to Chinese direction, major reasons that caused whole-word repetitions included syntactic difference and lexical comprehension and retrieval. Apart from these two reasons, numbers and unknown names were also found to cause whole-word repetitions in the Chinese to English direction.

Only a small amount of phrase repetitions (15.38% for student interpreters and 24.59% for professional interpreters) were found in both directions for both groups. In the English to Chinese direction, repetitions were used to help interpreters better organise their thoughts to provide a complete sentence and to convey the meaning delivered in the source language to the target audience, based on their language behaviour. In rare cases, one interpreter unconsciously used a synonym (Example 4.45), which was also regarded as a repetition in this study. This phenomenon was not found in the Chinese to English direction. In Chinese to English, numbers and four-character Chinese idioms became the major triggers that caused whole-word repetitions.

Through the comparison of student interpreters and professional interpreters, student interpreters were found to have more part-word repetitions and whole-word repetitions than professional interpreters in both directions. The percentage of phrase repetitions was higher in the professional group than in the student group. Through the qualitative analysis of their interpretations, it was observed that repetitions were not simply a cognitive problem but could also be used by student and professional interpreters as a buffer to have more time to think and restructure their expressions.

Chapter 5 Analysis of Repairs in SI

This chapter provides a comprehensive analysis of repairs in SI. Section 5.1 presents the quantitative analysis of repair frequency in both directions in the student and professional groups respectively, followed by a comparison between the two groups in each direction. This aims at determining whether directionality has an impact on repair frequency in both groups of interpreters. Section 5.2 gives full weight to the discussion of repair types identified in the interpreting corpora in each direction, which include appropriateness repairs, different repairs, error repairs, mid-articulatory repairs, and repair failures.

5.1 Impact of directionality on repair frequency in SI

To examine the impact of directionality on repair frequency in SI, Sections 5.1.1 and 5.1.2 focus on the quantitative analysis of the total number of repairs that were made by student and professional interpreters and their repair frequency per minute in each direction. Section 5.1.3 focuses on an inter-group comparison between student interpreters and professionals.

5.1.1 Repair frequency: Student group

Table 5-1 below presents the total number of repairs of each category in the student group. It shows that the total number of repairs in the English to Chinese direction was 265 and the repair frequency was 1.736. Student interpreters made 226 repairs with a repair frequency of 2.020. As for the repair frequency of each participant, 6 out of the 10 student interpreters repaired more frequently in the Chinese to English direction, while 4 students had more repairs in the other direction.

Table 5-1 Repair frequency: Student group

Participant	Interpreting direction	Total number of repairs (times)						Duration (minutes)	Frequency (times/minute)
		Appropriateness repairs	Different repairs	Lexical repairs	Phonetic repairs	Mid-articulatory repairs	Repair failures		
S1	E to C	2	2	1	1	9	6	15.033	1.397
	C to E	2	1	2	0	6	13	11.217	2.140
S2	E to C	1	2	3	0	9	6	15.333	1.370
	C to E	0	3	5	0	11	8	11.217	2.407
S3	E to C	2	3	2	1	7	2	15.3	1.111
	C to E	0	1	2	1	13	3	11.2	1.786
S4	E to C	7	8	5	0	7	7	15.283	2.232
	C to E	1	3	4	0	7	6	11.15	1.883
S5	E to C	2	0	8	6	7	3	15.267	0.097
	C to E	0	2	6	0	11	8	11.267	2.400
S6	E to C	1	0	7	1	16	7	15.317	2.089
	C to E	2	1	4	0	4	3	11.067	1.265
S7	E to C	6	4	7	1	13	10	15.317	2.677
	C to E	1	3	5	1	9	3	11.117	1.979
S8	E to C	4	0	13	0	5	6	15.25	1.836
	C to E	9	3	8	1	3	11	11.117	3.148
S9	E to C	1	4	2	1	2	0	15.3	0.654
	C to E	1	1	2	0	1	1	11.233	0.534
S10	E to C	0	4	5	2	19	5	15.267	2.293
	C to E	0	5	4	3	16	2	11.283	2.659
Total	E to C	26	27	53	13	94	52	152.667	1.736
	C to E	16	23	42	6	81	58	111.868	2.020

The following tables further answers the question of whether directionality has an impact on repair frequency in the student group.

Table 5-2 Tests of normality: Repair analysis in student group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C repair frequency	.138	10	.200*	.962	10	.811
C to E repair frequency	.175	10	.200*	.965	10	.837

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 5-2 shows that the repair frequency data in the student group are normally distributed (sig >0.05).

Table 5-3 Paired-samples t-test: Repair analysis in student group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C repair frequency	1.57560	10	.803853	.254201
	C to E repair frequency	2.02010	10	.733538	.231965

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C repair frequency - C to E repair frequency	-.444500	.975746	.308558	-1.142507	.253507	-1.441	9	.184

Table 5-3 indicates there was no statistical difference in repair frequency in English to Chinese direction (M=1.58, SD=0.80) and Chinese to English direction (M=2.02, SD=0.73) ; t(9)=-1.441, p=0.184. This means that repair frequency in the student group was not affected by directionality.

5.1.2 Repair frequency: Professional group

Table 5-4 shows the descriptive information about repairs in both directions. The total number of each category of repairs is 23, 41, 34, 18, 65 and 33 in the English to Chinese direction is and the repair frequency is 1.399. That in the Chinese to English

Table 5-4 Repair frequency: Professional group

Participant	Interpreting direction	Total number of repairs (times)						Duration (minutes)	Frequency (times/minute)
		Appropriateness repairs	Different repairs	Lexical repairs	Phonetic repairs	Mid-articulatory repairs	Repair failures		
P1	E to C	0	4	1	2	12	4	15.333	1.500
	C to E	2	1	1	0	2	3	11.167	0.806
P2	E to C	2	3	3	1	8	6	15.250	1.508
	C to E	2	3	2	2	3	3	11.083	1.353
P3	E to C	4	2	9	2	2	3	15.317	1.436
	C to E	0	0	5	2	5	2	11.233	1.246
P4	E to C	1	8	1	0	9	3	15.267	1.441
	C to E	1	3	2	0	6	5	11.150	1.525
P5	E to C	2	8	3	2	3	4	15.283	1.440
	C to E	2	0	2	0	4	1	11.150	0.807
P6	E to C	1	1	1	2	6	2	15.300	0.850
	C to E	1	0	0	0	0	0	11.167	0.090
P7	E to C	2	4	2	1	2	5	15.300	1.046
	C to E	2	4	5	0	9	0	11.117	1.800
P8	E to C	3	2	3	2	3	0	15.300	0.850
	C to E	0	0	2	0	1	1	11.217	0.357
P9	E to C	3	5	4	4	11	4	15.300	2.026
	C to E	1	5	8	4	6	6	11.183	0.164
P10	E to C	5	4	7	2	9	2	15.283	1.900
	C to E	1	6	2	1	4	1	11.083	1.353
Total	E to C	23	41	34	18	65	33	152.933	1.399
	C to E	12	22	29	9	40	22	111.550	1.201

direction is 12, 22, 29, 9, 40 and 22, with a repair frequency of 1.201. Based on the repair frequency of each participant, except P4 and P7, the repair frequency of the other professional interpreters was slightly higher in the English to Chinese direction.

Table 5-5 Tests of normality: Repair analysis in professional group

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
E to C repair frequency	.237	10	.119	.908	10	.270
C to E repair frequency	.190	10	.200*	.928	10	.424

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 5-5 indicates that the data in both directions are normally distributed (sig >0.05).

Table 5-6 Paired-samples t-test: Repair analysis in professional group

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	E to C repair frequency	1.39970	10	.394184	.124652
	C to E repair frequency	.95010	10	.597754	.189026

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	E to C repair frequency - C to E repair frequency	.449600	.673591	.213008	-.032258	.931458	2.111	9	.064

Table 5-6 shows there was no statistically significant difference in the scores for the English-Chinese direction (M=1.40, SD=0.39) and Chinese-English direction (M=0.95, SD=0.60); t(9)=2.111, p=0.064. These results suggest that repair frequency in the professional group was not influenced by directionality.

5.1.3 Repair frequency: Inter-group comparison

This section presents the inter-group comparisons conducted to investigate the difference of repair frequency across the student interpreters and professional interpreters in each interpreting direction.

5.1.3.1 Repair frequency: English to Chinese direction

Table 5-7 shows that the student and professional sets of data are normally distributed (sig >0.05) in this direction.

Table 5-7 Tests of normality: Repair analysis between two groups in English to Chinese direction

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Group	Statistic	df	Sig.	Statistic	df	Sig.
E to C repair frequency	S	.138	10	.200*	.962	10	.811
	P	.237	10	.119	.908	10	.270

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 5-8 Independent t-test: Repair analysis between two groups in English to Chinese direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
E to C repair frequency	S	10	1.57560	.803853	.254201
	P	10	1.39970	.394184	.124652

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
E to C repair frequency	Equal variances assumed	5.408	.032	.621	18	.542	.175900	.283119	-.418910	.770710
	Equal variances not assumed			.621	13.092	.545	.175900	.283119	-.435305	.787105

Table 5-8 shows that the repair frequency in the student group was not significantly higher than in the professional group; t(18)=0.621, p=0.542. It indicates that level of expertise does not have an impact on repair frequency in the English to Chinese direction.

5.1.3.2 Repair frequency: Chinese to English direction

Table 5-9 shows that the student and professional sets of data are normally distributed (sig >0.05) in this direction.

Table 5-9 Tests of normality: Repair analysis between two groups in Chinese to English direction

Tests of Normality

	Group	Kolmogorov-Smirnov[a] Statistic	df	Sig.	Shapiro-Wilk Statistic	df	Sig.
C to E repair frequency	S	.175	10	.200*	.965	10	.837
	P	.190	10	.200*	.928	10	.424

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Table 5-10 Independent t-test: Repair analysis between two groups in Chinese to English direction

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
C to E repair frequency	S	10	2.02010	.733538	.231965
	P	10	.95010	.597754	.189026

Independent Samples Test

		Levene's Test for Equality of Variances F	Sig.	t-test for Equality of Means t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference Lower	Upper
C to E repair frequency	Equal variances assumed	.022	.885	3.576	18	.002	1.070000	.299230	.441340	1.698660
	Equal variances not assumed			3.576	17.295	.002	1.070000	.299230	.439499	1.700501

Table 5-10 indicates that student interpreters (M=2.02, SD=0.73) had statistically significantly higher repair frequency compared to professional interpreters (M=0.95, SD=0.60); t(18)=3.576, p=0.002. This means that repair frequency in the Chinese to English direction was influenced by level of expertise.

5.1.4 Summary

To sum up, in terms of the impact of directionality on repair frequency, results of both groups show that repair frequency is not statistically different across interpreting directions. In the inter-group comparison, the results show that repair frequency is not statistically different in the student interpreters compared to the professional interpreters in the English to Chinese direction. However, in the Chinese to English

direction, there is a statistically significant difference between the groups - students repaired more frequently than the professional interpreters.

5.2 Analysis of different categories of repairs in SI

As discussed in Section 3.2.3, the analysis criteria for self-repairs in SI include appropriateness repairs, different repairs, error repairs (lexical and phonetic), mid-articulatory repairs and repair failures. Based on the figures provided in Table 5-1 and Table 5-4, Table 5-11 further demonstrates the distribution of each category of repairs for both groups in each direction.

Table 5-11 Distribution of repairs

Group	Direction	Appropriateness repairs (%)	Different repairs (%)	Lexical error repairs (%)	Phonetic error repairs (%)	Mid-articulatory repairs (%)	Repair failures (%)
Students	E to C	9.81%	10.19%	20%	4.91%	35.47%	19.62%
	C to E	7.08%	10.18%	18.58%	2.65%	35.84%	25.66%
Professionals	E to C	10.75%	19.16%	15.89%	8.41%	30.37%	15.42%
	C to E	8.96%	16.42%	21.64%	6.72%	29.86%	16.42%

As shown in Table 5-11, the highest percentage of repairs were mid-articulatory repairs while phonetic repairs were the lowest, regardless of interpreting direction or group difference. In the English to Chinese direction, the percentage of lexical error repairs, mid-articulatory repairs, and repair failures in the student group was higher than that in the professional group. In the Chinese to English direction, except mid-articulatory and repair failures, the percentage of the remaining repairs in the professional group was higher than that in the student group. For student interpreters, repair failures in the Chinese to English direction were more than in the other direction (19.62% vs 25.66%). As for professional interpreters, excepting the almost 6% difference in lexical error repairs between two directions, the quantitative difference of the remaining repair categories between two directions was within 3%.

5.2.1 Repairs in the English to Chinese direction

5.2.1.1 Appropriateness repairs

As discussed in Section 3.2.3, appropriateness repair is one of the post-articulatory repairs and it refers to intended information that needs qualification in view of the context of expression (see, e.g., Kormos, 1998; Levelt, 1983; Petite, 2005). Based on the current corpora, the reasons that were identified for making appropriateness repairs include idiomaticity, added output, preciseness, and register. This section will look at each of these reasons coupled with selected examples from the corpora.

The first subcategory is to improve the idiomaticity of the target language.

Example 5.1:

ST: ...throughout all of the goals of the global sustainable development goals.			
Participant	SI	Gloss	BT
P1	...[那]所以我们要实现*全球持续化发展，可持续发展*的话...	...[Well] So we need realise *globe continuing development, sustainable development* de (particle) word...	...[Well] So if we need to realise *global continuing development, sustainable development*...

In this example, the phrase that was repaired is 'the global sustainable development'. The interpreter articulated '全球持续化发展 (global continuing development)', then repaired it with '可持续发展 (sustainable development)'. In Chinese, although both '持续化发展' and '可持续发展' have a meaning of developing at a certain rate or level, the latter expression is an idiomatic one.

The second subcategory is the case where interpreters add some output.

Example 5.2:

ST: ...the mentors who have made a difference for us.			
Participant	SI	Gloss	BT
P3	...比如说有*很多的导师，人生导师*。	...for example say have *many mentors, life mentors*.	...for example, there are *many mentors, mentors throughout the life*.

As shown in Example 5.2, in the ST, the speaker mentioned 'mentors', which means a person who trains and guides someone. In P3's interpretation, s/he interpreted as '很多的导师，人生导师 (many mentors, mentors throughout the life)'. It is obvious that the phrase 'throughout the life' was added by the interpreter. '导师' in Chinese focuses more on academic support while '人生导师' refers to people who guide you and play the role of a friend at the same time. By adding the output, the interpreter provided a more appropriate meaning based on the context and avoided the ambiguity.

Example 5.3:

ST: ...for committed activists and researchers (a) to dive deep (b).			
Participant	SI	Gloss	BT
P5	...那么尤其是*对于研究员呢，[嗯]各个领域的研究员* (a)，也应当对[嗯]性别平等的问题做出更多的研究。	...Then especially is *for researcher ne (particle), [um] every area de (particle) researcher* (a), also should to [um] gender equality de (particle) problem make more research.	...Then especially *for researchers, [um] researchers in all areas* (a), they should do more studies on the issue of [um] gender equality.
P8	...因为这里能够帮助*研究人员以及大家* (a) *去了解去更好地了解妇女[嗯]权利的现实* (b)。	...Because here can *help researchers and everyone* (a) *to understand to better understand woman [um] right de (particle) reality* (b).	...Because this can *help researchers and everyone* (a) *to understand to better understand the reality of women's [um] rights* (b).

Example 5.3 shows two cases of adding output. The first participant P5 interpreted '研究员 (researchers)' as 'researchers in all areas' and 'dive deep' as 'do more studies on the issue of gender equality' respectively in Chinese. The interpreter commented that the meaning of both parts was not clear enough if it is translated into Chinese based on its literal meaning. Therefore, s/he added some information in his/her output to make the meaning more explicit based on the context. A similar strategy was also adopted by another professional interpreter. In P8's interpretation, s/he added

‘everyone’ after ‘researchers’. By comparing the meaning between the ST and the interpretation, it seems to be deviated. The interpreter recalled that this is because when s/he processed the information in the previous sentence, s/he did not hear the key words ‘committed activists’. However, the speaker encouraged listeners to explore the website, but the interpreter believed that this website should not only be used by researchers but could also be accessed by the general public. Therefore, the interpreter decided to add ‘everyone’ in the interpretation.

Example 5.4:

ST: ...it can be measured.			
Participant	SI	Gloss	BT
P7	...*它的作用是可以衡量的，可以用数字衡量的*。	...*Its function is can measured, can use figure measured*.	...*Its function can be measured, and it can be measured by figures*.

Taking the context into consideration, ‘it’ in this sentence refers to ‘the power of full participation, particularly in the formal business sector’. In P7’s interpretation, the interpreter added ‘it can be measured by figures’ but this information is not included in the ST. Nevertheless, the added information is not in conflict with the meaning as the speaker mentioned previously that the full participation could make the economy grow by nearly 10%.

The next category in appropriateness repairs is how interpreters repaired their interpretations to improve the preciseness depending on the original ST delivered by the speaker.

Example 5.5:

ST: ...when every year more than one million girls (a) are never born because of gender-biased sex selection (b)...			
Participant	SI	Gloss	BT
S7	...所以就导致有*很多女性[呃][这个]一百万女生* (a) 都没有法出生...	...So lead to have *many woman [uh] [well] one million girl* (a) all no opportunity born...	...So it causes that there are *many women [uh] [well] one million girls* (a) that do not have an opportunity to be born...
P6	...而且每一年有超过一百万的女孩，她都没有办法出生，因为*这种性别的偏见或者是因为这种性别的选择* (b)...	...And every one year have more one million de (particle) girl, she all no opportunity born, because *this gender de (particle) bias or is because this gender de (particle) selection* (b)...	...And every year, there are more than one million girls who are never born because of *the gender bias or because of the sex selection* (b)...

Two participants were found to have repairs related to this sentence. In S7's interpretation, the interpreter firstly uttered 'many women', followed by two filled pauses before repairing it into 'one million girls'. The repair was successful as it expressed the same meaning as the ST. The second repair was made because of the translation of the phrase 'gender-biased sex selection'. If this phrase is translated into Chinese, it becomes '带有性别偏见的性别选择'. However, in terms of interpretation it is very long and difficult to express it. The interpreter chose to use 'or' to disguise

the repair by combining the two phrases to improve the completeness of the meaning and such repair was acceptable in terms of the meaning.

The last category in appropriateness repairs is related to the consideration of register.

Example 5.6:

ST: I think we can be gratified that we have stuck together as a world that we have continued to make the case and found new ways of making it.			
Participant	SI	Gloss	BT
S6	我们应该感到很高兴，现在大家*齐聚一起，齐聚一堂*，全世界团结一起寻找新的道路去解决这一事情。	We should feel very happy, now everybody *come together, come together in one place*, whole world unite together look for new way to solve the problem.	We should be gratified that now everybody *has come together, come together in one place* and the whole world is united to look for new ways to solve the problem.

The interpreter repaired '齐聚一起' (come together) into '齐聚一堂' (come together in one place). In fact, both expressions mean to stick together or come together. The minor difference is that the latter expression has a higher register as it is a Chinese idiom. In this example, it explicitly demonstrated that the interpreter took register into consideration in his/her interpretation.

5.2.1.2 Different repairs

Different repairs are those in which the speaker realises that another arrangement of messages would be easier or more effective (see, e.g., Kormos, 1998; Levelt, 1983; Petite, 2005). Through the examination of the current corpora, the repairs made by interpreters have a characteristic that "the interpreter starts with an utterance, stops, and repairs by changing the word order or the direction of the utterance" (Petite, 2004, p.210) and interpreters either abandoned their first solution to achieve completion or abandoned their first alternative to go back and change the construction . In the English

to Chinese direction, professional interpreters made more different repairs than student interpreters (19.16% vs 10.19% see Table 5-11). The following examples further explain how these repairs were made.

The first category is the case where interpreters abandoned their first solution to complete the sentence.

Example 5.7:

ST: ...but it is our job to keep the ambition of Beijing alive to keep marching forward.			
Participant	SI	Gloss	BT
S9	...因此，*我们现在我们的工作就是让我们当时在北京的大会所宣示的东西成真*，并且不断地前进。	...Therefore, *we now our job is let we at that time in Beijing de (particle) conference declared thing become real*, and continuously move forward.	...Therefore, *we now our job is to let what we have declared in Beijing's Conference become true*, and continuously move forward.
P10	...同时还要*让北京当时的这样的一个精神，重塑这个精神*，并且继续向前推进。	...at the same time also *let Beijing at that time such a spirit, reshape this spirit*, and keep move forward.	...at the same time, we need to *let Beijing's spirit at that time, reshape this spirit* and keep moving forward.

As shown in Example 5.7, the two interpreters (S9 and P10) abandoned their first solution when they interpreted 'keep the ambition of Beijing alive'. The student interpreter started with 'we now' but found s/he was not able to continue the utterance with this structure. Therefore, s/he decided to change the subject to 'our job' and completed the sentence. As for the professional interpreter, s/he used 'let' structure in

Chinese but did not manage to collocate ‘let’ and ‘alive’ in one sentence. S/he restructured it into ‘reshape this spirit’ to complete the sentence.

Example 5.8:

ST: We’ve proven that progress is possible, but we can’t preach just to ourselves.			
Participant	SI	Gloss	BT
P9	我们认为这样的进步是有可能实现的，*但是我们不能我们单单我们自己是没有办法取得的*。	We think such progress is have possible realised, *but we cannot we alone we ourselves is no way achieved*.	We think such progress is possible, *but we cannot we alone we cannot achieve it by ourselves*.

As reported by many interpreters in the retrospective interview, the sentence ‘but we can’t preach just to ourselves’ is not easy to translate, especially the word ‘preach’. This problem was reflected in Example 5.8. From the interpretation, it can be seen that the interpreter made several attempts to express the meaning. P9 firstly used ‘we cannot’, followed by ‘we alone’ before finally translating it into ‘we cannot achieve it by ourselves’. Though it is not the same as ‘preach’ in literal meaning, the repaired translation achieved the contextual effect because ‘preach’ means to disseminate the fact of possible progress to everyone, and that such progress can only be achieved by joint efforts.

Example 5.9:

ST: My late mother was born before women in the United States could vote.			
Participant	SI	Gloss	BT
P4	我的母亲在女性*还没无法投票的时候*就出生了。	My mother in woman *not yet could not vote de (particle) time* born.	My mother was born when women *not yet could not vote*.

In Example 5.9, the interpreter firstly chose to start the sentence by using ‘not yet’, but then realised that s/he was not able to complete the sentence. Therefore, s/he changed the word to ‘could not’ and completed the sentence.

The following examples demonstrate how interpreters abandoned their first solution to go back and change the construction.

Example 5.10:

ST: I want to thank the Secretary-General for his leadership on these issues over the year of his tenure.

Participant	SI	Gloss	BT
S4	*他[嗯]我非常感谢他*对妇女事事[嗯]事宜作出*的贡献*。	*He [um] I very much thank he* on women iss-iss-[um] issue *make contribution*.	*He [um] I want to thank him for his contribution* to women’s iss-iss-[um] issues.

As shown in Example 5.10, the interpreter started the sentence with ‘他 (he/him)’, followed with a filled pause and then repaired it with the utterance ‘I’ to start another sentence before going back to repeat ‘他 (he/him)’ again. According to the interpreter’s recollection, s/he struggled with the translation of ‘Secretary-General’. When s/he started the interpretation, what s/he heard was ‘for his leadership’. That is the reason why the interpreter used ‘他 (he/him)’ to lead the sentence.

Example 5.11:

ST: ...and I would speak with my colleagues across the world about these issues.			
Participant	SI	Gloss	BT
P5	...我和*我的同事们来自世界各地同事们*谈论这些问题。	...I and *my colleagues from world everywhere colleagues* discuss these issues.	...I would discuss with *my colleagues my colleagues across the world* about these issues.
P6	...我也和*我的同事一起来自于全球的同事*去讨论这些话题。	...I also and *my colleagues together from world colleagues* to discuss these issues.	...I also discuss with *my colleagues together my colleagues across the world* about these issues.

Due to the syntactic difference, the interpretation of the phrase 'my colleagues across the world' needs to be restructured into the order of 'across the world my colleagues' in Chinese (Example 5.11). As shown in the interpretations, both interpreters articulated 'my colleagues' for the first time, then abandoned this translation by adding 'across the world' and completed the translation.

5.2.1.3 Lexical error repairs

This section includes some examples related to lexical error repairs.

Example 5.12:

ST: That is the wisdom behind the Women's Empowerment Principles.			
Participant	SI	Gloss	BT
S8	这就是*女权增强妇女权能原则*背后的智慧。	This is *woman right strengthen woman empowerment principle* behind wisdom.	This is the wisdom behind *women's rights the Women's Empowerment Principles*.

Example 5.12 shows how the interpreter repaired the lexical error. The interpreter translated 'the Women's Empowerment Principles' into '女权 (women's rights)' first and immediately repaired it into '增强妇女权能原则 (Women's Empowerment Principles)' when s/he realised that the term was not translated correctly.

Example 5.13:

ST: A girl born in (a) Lesotho 20 years ago (b) could not hope to one day own property or sign a contract.			
Participant	SI	Gloss	BT
S6	一个*生存在出生在* (a) 莱索托的女孩，二十年前不可以不可能有一天会拥有房产或者是签约。	A *live in born in* (a) Lesotho de (particle) girl, two ten year ago can not not possible have one day can own property or is sign contract.	A girl *lives in born in* (a) Lesotho 20 years ago could not is not possible to one day own property or sign a contract.
P3	[嗯]每个女孩每个女婴其实不管她是在莱索托还是其他的发展中国家，[这个]出生的话，她们*二十岁二十年以前* (b) 她们不可能拥有财产或者签订合同。	[um] every girl every baby girl in fact no matter she is in Lesotho or other developing country, [well] born if, they *two ten years' old two ten years ago* (b) they cannot own property or sign contract.	[um] No matter a girl a baby girl was born in Lesotho or other developing countries, they could not own a property or sign a contract *20 years' old 20 years ago*.

In example 5.13, the student interpreter (S6) had a repair of the phrase 'be born in'. S/he originally said '生存在 (live in)' and then immediately repaired it with the expression '出生在 (born in)', which is correct in meaning. As for the professional interpreter (P3), what s/he repaired was an expression with a number included. The participant accidentally interpreted '20 years ago' into '二十岁 (20 years' old)'. When s/he realised the error, the interpreter repaired it with '二十年以前 (20 years ago)', which expressed the same meaning as the ST.

Example 5.14 below also elaborates how interpreters repaired number-related errors.

Example 5.14:

ST: ...representatives from 189 nations...			
Participant	SI	Gloss	BT
S4	...有[嗯]*一百八十五[嗯]有一百八十九*个国家...	...have [um] *one hundred eight ten five [um] have one hundred eight ten nine* ge (measure word) country...	...there are [um] *185 [um] 189* countries...
S5	...*一百九十一百八十九*个国家的代表...	...*one hundred nine ten one hundred eight ten nine* ge (measure word) de (particle) representative...	...representatives from *190 189* countries...

The ST mentioned ‘representatives from 189 nations’. As shown in the interpretations, two participants interpreted the number into ‘185’ and ‘190’ respectively in their first attempt. Both interpreters corrected the wrong number into the correct one. Also, a filled pause was found between the wrong number and the correction in S4’s translation.

5.2.1.4 Phonetic error repairs

The following three examples present some of the phonetic error repairs identified in the corpora. There are two main categories of phonetic errors in the English to Chinese direction, vowels and tone.

Example 5.15:

ST: ...<u>some</u> of you...		
Participant	SI with pinyin	BT
P2	...[嗯] 对于 你们 中 的 *<u>一星 一些</u>*人 来 说...	...[um] for *<u>some</u>* of you...

Example 5.15 presents the repair of vowels. ‘Some’ in the ST should be translated into ‘一些 (yī xiē)’ in Chinese. The interpreter pronounced the word as ‘yī xīng’ before repairing it with the correct pronunciation.

The next two examples demonstrate tone-related repairs.

Example 5.16:

ST: ...are <u>growing</u> in number.		
Participant	SI with pinyin	BT
P3	...人数 在 不断地 *<u>增假</u>* *<u>增加</u>*。	...the number is continuously *<u>growing</u>*.

In Chinese, the word ‘grow’ is pronounced as ‘增加 (zēng jiā). However, the interpreter pronounced it as ‘增假 (zēng jiǎ)’ in the process of translation. It is obvious that the tone of the second character in this word changed from the first tone to the third tone, which was incorrect. As shown in Example 5.16, the interpreter successfully repaired it with the correct tone.

Example 5.17:

ST: ...no matter *<u>what</u>* the challenges the world throws at you...		
Participant	SI with pinyin	BT
S6	...不管 世界 向 你 呈现 *<u>甚样 什么样</u>* 的 挑战...	...no matter *<u>what</u>* the challenges the world presents to you...

Similarly, Example 5.17 also presents a tone-related correction. ‘What’ in English can be translated into ‘什么 or 什么样’ in Chinese. According to the utterance of ‘甚样 (shèn yàng)’, it is assumed that the interpreter attempted to say ‘shén me yàng’. Due to the slip of the tongue, the student interpreter firstly uttered ‘什’ in the fourth tone and omitted the pronunciation of ‘me’, which is incorrect, but finally repaired it with success in the second attempt.

5.2.1.5 Mid-articulatory repairs

This section further explores the phenomenon of mid-articulatory repairs. Unlike the appropriateness repairs, different repairs, lexical error, and phonetic error repairs that were discussed earlier, mid-articulatory repairs refer to within-word repairs (Petite, 2005). When examining corpora, it was found that interpreters might not always be able to repair after completing the utterance of the current word and they started repairing in mid-flow. This also showed that interpreters monitored their production during SI. In the English to Chinese direction, mid-articulatory repairs occupied the largest percent (35.47% for the student group and 30.47% for the professional group) among all repairs, and this applied to both groups of interpreters. Based on the corpora, this study found that the aim of taking mid-articulatory repairs is summarised as to improve the appropriateness or acceptability or to correct identified errors related to word choice or pronunciation.

Example 5.18:

ST: Bring women and girls off the margins and into the mainstream (a) of every profession (b) as well as every community and every country (c) has to be our mission now.			
Participant	SI	Gloss	BT
S6	让妇女融入主流社会，在*每-各行各业* (b)，在每个社区和国家，这必须是我们现在的使命。	Let women fit in mainstream society, in *eve-all walks of life* (b), in every community and country, this must be our now goal.	Letting women fit in the mainstream society, *eve-all walks of life* (b) as well as every community and every country needs to be our current mission now.
P10	然后*让她们能够进-女性能够进入主流* (a)，能够做任何的职业，能够*在任何的国家和真-然后在所有的社区都实现这一切* (c)，就是我们的目标。	Then *let they can en-women can enter into mainstream* (a), can do any profession, can *in any country and re-then in every community all realise this* (c), exactly our goal.	Then that *let them en-women enter into the mainstream* (a), do any profession, and *let this be realised in any country and re-then in every community* (c) has to be our goal.

As shown in Example 5.18, there are three places where interpreters were identified to have mid-articulatory repairs, which are marked as (a), (b) and (c) in the ST. In S6's translation, s/he repaired the expression by using a four-character phrase, which improved the appropriateness/acceptability of the target language. It is assumed that the interpreter originally wanted to use '每个行业 (every industry)'. Before the interpreter completely uttered it, s/he made a repair in mid-flow and changed the

articulation into ‘各行各业 (every walks of life)’. P10 was found to have two mid-repairs, which were aimed at improving the appropriateness and completing the utterance. For repair (a) in P10’s translation, the interpreter used ‘they’ before repairing it with ‘women’. Though using ‘they’ is also a correct expression, the word ‘women’ is more accurate and explicit. The second repair (c) happened when the interpreter processed the information ‘every country and every community’. The interpreter uttered part of the word followed by a repair to complete the sentence.

Example 5.19:

ST: ...who are doing the, sometimes, dangerous work...			
Participant	SI	Gloss	BT
P9	有的时候可能会有一些危-做一些危险的工作...	sometimes may *can have some dan-do some dangerous work*...	...sometimes they may *have some dan-do some dangerous work*...

In Example 5.19, the interpreter might have wanted to express ‘have some dangers’, which makes sense in meaning but does not completely reflect the original sentence pattern in the translation. Therefore, the interpreter decided to make a mid-articulatory repair with the phrase ‘做一些危险的工作 (do some dangerous work)’, which improved the appropriateness in the target language.

The next two examples present mid-articulatory repairs related to lexical errors.

Example 5.20:

ST: UN Women			
Participant	SI	Gloss	BT
P2	*妇-联合国妇女署*	*Wo-UN Women*	*Wo-UN Women*
P4	*女 xi-[呃]联合国妇女署*	*Fema-[um] UN Women*	*Fema-[um] UN Women*

Both of two interpreters made a mid-articulatory repair when they translated ‘UN Women’ (Example 5.20). The first interpreter (P2) articulated ‘Wo-’ and then realised that ‘UN’ was not translated. S/he corrected it to ‘UN Women’ without finishing the full pronunciation of ‘women’. The second interpreter had a similar situation. ‘女 xi-(Fema-)’ was uttered first, followed with a filled pause before being repaired with the correct expression.

Example 5.21:

ST: ...recognizing the crucial role of women in peace-making and security.			
Participant	SI	Gloss	BT
S10	...认可了女性在*和-维和*和安全方面的作用。	...recognised woman in *pea-protect peace* and security aspect de (particle) role.	...has recognised the role of women in *pea-peace-making* and security.
P4	...认识到女性在*和-维和*中的重要角色。	...recognise woman in pea-protect peace in de (particle) crucial role.	...recognising the crucial role of women in pea-peace-making.

Example 5.21 demonstrates that the interpreter followed the original source text too closely and had a short EVS, which caused the wrong choice of word and a subsequent repair. In other words, without listening to the word ‘peace-making’ completely, s/he started to translate ‘peace’ and this is why ‘和 (pea-)’ was firstly uttered. Without finishing the utterance, the interpreter realised that it should be interpreted into ‘维和 (peace-making)’ and made the repair accordingly.

Example 5.22:

ST: ...have led the way out of that dark time...		
Participant	SI	BT
P4	y ǐjīng zǒuchū zhèzhǒng ē n yīn à n 已经 走出 *这种 恩-阴暗* d e yīnyǐng *的 阴影*...	...have already walked out of *the dark shadow*...

Example 5.22 shows the mid-articulatory repair regarding phonetic error. When this sentence was transcribed, it was initially assumed to be a filled pause. However, after checking the original interpretation and confirming with the external checker, it was identified as a mid-articulatory repair at phonetic level. The reasons are twofold. The mispronounced sound is very short, and it has the first tone. As for filled pauses, these are usually with a downward intonation and a long pause. It is obvious that the interpreter had a slip of tongue and mispronounced '阴 (yīn)' as '恩 (ēn)'.

5.2.1.6 Repair failures

This section discusses repair failures in the English to Chinese direction. Student interpreters had a higher percentage (19.46%) of repair failures while this number was lower in the professional group (15.42%). There are two main categories of repair failures in the corpora: (1) repaired translations contain errors; (2) repaired translations deviate from the meaning of the ST.

Example 5.23:

ST: ...there's never been a better time in history to be born female.			
Participant	SI	Gloss	BT
S1	...*在现在的女性现在比以前都就要幸福*。	...*In now de (particle) women now than before all about to happy*.	...*In women in nowadays all about to be happy now than before*.

In Example 5.23, the interpreter started with the preposition 'in' and it is assumed that the interpreter might have wanted to interpret 'in history' first. However, s/he changed their mind by repairing it with a different subject and completing the sentence. Nevertheless, such endeavour was not successful because the repaired sentence was

not grammatically correct or idiomatic. Besides, '都 (all)' and '就要 (about to)' cannot be used together and this does not conform to Chinese language grammar.

Example 5.24:

ST: We are not there yet, when despite having increased the number of countries prohibiting domestic violence from just thirteen in 1995 up to 76 today.			
Participant	SI	Gloss	BT
P3	当然也有很多的家暴，有*很多76%*都无法去保证[嗯]无法去保障[这个]家庭暴力。	Of course also have many de (particle) family violence, have *many 76 percent* all can not make sure [um] can not go guarantee (well) family violence.	Of course there are also many domestic violence cases, there are *many 76%* that cannot make sure [um] cannot guarantee [well] domestic violence.

This repair failure in Example 5.24 is related to the interpretation of the number '76'. In the ST, what the speaker expressed was that the number of countries prohibiting domestic violence had increased from thirteen to 76. In P3's version, s/he originally said 'many', then followed with '76%'. The interpreter tried their best to interpret the number but failed in the end.

Example 5.25:

ST: We're not there yet when we've nearly closed the global gender gap in primary school, but more than 30 million girls never go on to secondary school.			
Participant	SI	Gloss	BT
S1	[嗯]*有三万三万的学生无法，三百万的学生*无法上高中。	[um] *Have three ten thousand three ten thousand de (particle) student can not, three million de (particle) student* can not up senior high school.	[um] There are *thirty thousand thirty thousand students who cannot, three million students* who cannot go to senior high schools.
S4	我们还是没有达到预期目标，我们差一点就关闭了这些[嗯]小学，有[嗯]*四-[啊]有多于四千万万*的女孩，差点就没能上到有到上学的机会。	We yet not achieve expectation goal, we nearly about to close le (particle) these [um] primary school, have [um] *four- [ah] have more than four thousand ten thousand ten thousand* de (particle) girl, nearly about to no can up to have to go to school de (particle) opportunity.	We still haven't reached the expected goal yet. We've nearly closed these [um] primary schools, and there are [um] *four- [ah] there are more than forty million million* girls who almost cannot have opportunities to go to school.

Example 5.25 is the same as the previous example with a repair failure relating to number. S1 had a repetition of '三万 (thirty thousand)' and then realised that the number was not uttered correctly. S/he repaired it with '三百万 (three million)' but still it was not a successful repair. Similar to the problem of S1, S4 uttered '四 (four)', followed with a filled pause '啊 (ah)' and repaired the number with '多于四千万 (more than 40 million)'. Besides this, the character '万 (ten thousand)' was repeated twice. Both interpreters' repair attempts failed and did not achieve the aim.

Example 5.26:

ST: ...and I could almost read their minds.			
Participant	SI	Gloss	BT
S6	我几乎可以 x-听到他们的想法。	I almost could *x-listen to their idea*.	I could almost *x-listen their ideas*.

Example 5.26 is an unsuccessful mid-articulatory repair. The interpreter articulated a consonant sound 'x' and repaired it with '听到他们的想法 (listen their thoughts)'. Nevertheless, the repaired utterance deviated from the original meaning expressed by the speaker.

The two examples below demonstrate that interpreters might originally have the correct interpretations but repaired them wrongly in later version. Therefore, such a phenomenon also belongs to repair failure.

Example 5.27:

ST: What we are doing here today is smart for companies and smart for countries.			
Participant	SI	Gloss	BT
P2	我们今天在这里做的这件事情，是不仅是为了*公-[呃]社会*，也是为了国家。	We today in here do de (particle) this thing, is not only is *for com-[um] society*, also is for country.	What we are doing here today is not only *for com-[um] the society*, but also for countries.

In Example 5.27, the interpreter firstly uttered '公 (com-)'. Based on the context, it is highly possible that the interpreter wanted to say the word '公司 (company)'. Without fully articulating the word, s/he changed the word to '社会 (society)', which is obviously not the same as what is expressed in the ST.

Example 5.28:

ST: ...and the United States has a responsibility and continues to lead on these issues...			
Participant	SI	Gloss	BT
P10	...*在美-，我觉得在联合国*我们需要领导这一切的发生...	...*in Uni-, I think in the United Nations* we need lead this all de (particle) happen...	...*in the Uni-, I think in the United Nations* we need to lead on these to make it happen...

This is also a similar example. Originally, the interpreter said '美 (Uni-)' before changing it to '联合国 (United Nations)'. According to the interpreter's recollection, s/he vaguely heard the 'United States' but was not sure if s/he heard it correctly during the process of SI. Based on the latter information 'lead on these issues' and the prior knowledge, s/he felt that what s/he heard might be wrong and it must be the United Nations to lead on these issues. This explains why the interpreter made a wrong repair.

5.2.2 Repairs in the Chinese to English direction

5.2.2.1 Appropriateness repairs

This section discusses appropriateness repairs in the Chinese to English direction. Appropriateness repairs comprised the second least amount of all the repair categories. The percentage of appropriateness repairs found in the professional group were about the same as those in the student group (8.96% vs 7.08%). The following examples selected from the corpora demonstrate appropriateness repairs from the perspectives of improved idiomaticity and preciseness.

Example 5.29:

ST: 全球 143 个国家通过立法明确规定男女平等... Gloss: Globe one four three ge (particle) countries through legislation explicit rule man woman equality... BT: 143 countries have enshrined gender equality in their laws...	
Participant	SI
S6	Because of the efforts we've made, *some a hundred and forty-three countries* in the world have laws that ensure *equal gender equality*...

Example 5.29 shows that S6 made two appropriateness repairs when s/he articulated this sentence. The first repair was made when s/he improved the preciseness of the interpretation of the number '143'. It is acceptable and common to use vague expressions such as 'many' and 'a lot of' to indicate a large number when interpreters feel that they are not able to provide the translation of a certain number under the current condition of their available efforts. As shown in the translation, what the interpreter provided was 'many' and s/he motivated his/her available effort to repair it with 'a hundred and forty-three countries', which is a successful repair to improve the preciseness. The second repair was made to improve the idiomaticity. Based on the interpretation, it is likely that the interpreter wanted to use 'equal gender'. However, though 'equal gender' makes sense, 'gender equality' is a more idiomatic and more frequently used expression in English.

Example 5.30:

ST: ...打破有碍妇女发展的落后观念和陈规旧俗。 Gloss: ...break have prevent woman development de (particle) outdated mentality and old rule old custom. BT: ...dismiss outdated mentalities and customs inhibiting women's development.	
Participant	SI
S8	...it's important to break [um] to break down the *old outdated* traditions.

Example 5.30 also shows the repair made for improvement of idiomaticity. It has been discussed earlier that four-character idioms or words are often used in Chinese official documents. In this sentence, the speaker used '陈规旧俗 (outdated customs)' to express the factors that hinder women's development. As shown in the translation, the interpreter originally used 'old' and then repaired it with 'outdated'. Though 'old' and 'outdated' have similar meanings, the word 'outdated' also implies something that is not applicable. Based on the context, 'outdated' is more suitable to collocate with nouns such as 'customs' or 'traditions'.

The following Examples 5.31 and 5.32 present cases where interpreters tried to improve the preciseness of the nuances with a repair.

Example 5.31:

ST: ...推动妇女参加社会和经济活动...	
Gloss: ...promote woman participate in society and economy activity...	
BT: ...a higher level of social and economic participation by women...	
Participant	SI
P9	We should *drive them to drive women to* take part in social affairs in order to seek a better economic development...

In the ST, the speaker mentioned '推动妇女 (promote women)' and the interpreter firstly uttered 'drive them to'. Taking the audience into consideration, this might be confusing in terms of what the word 'them' refers to. The interpreter immediately changed it to 'women' to make the coreference much clearer.

Example 5.32:

ST: ...共建共享一个对所有妇女、对所有人更加美好的世界！ Gloss: ...together build together share one to all woman, to all people more beautiful world. BT: ...to build a better world for women and for all.	
Participant	SI
P4	*We will we should create* a better world for all women.

This is the end of the speech and the speaker called for listeners to take further actions. In the translation, the interpreter started the sentence with 'we will' and then repaired it with 'we should'. In terms of tone, it is for sure that 'we should' is more affirmative and suitable given the context. Therefore, the interpreter precisely expressed the tone through this repair to let the audience feel the speech tone delivered by the speaker.

5.2.2.2 Different repairs

In terms of different repairs in the Chinese to English direction, professional interpreters were more flexible in making these repairs, especially in sentence structure. The number of repairs made by the professional interpreters was more than those made by student interpreters (16.42% vs 10.18%). Examples below demonstrate the situation where interpreters made different repairs, either because they abandoned their first solution to achieve completion or abandoned their first alternative to go back and adjust the construction.

The first group of examples (Examples 5.33, 5.34 and 5.35) focus on the impact of syntactic asymmetry on different repairs, which required interpreters to abandon their first solution and change the word order to complete the translation.

Example 5.33:

ST: 在联合国成立 70 周年、北京世界妇女大会召开 20 周年之际...
Gloss: In United Nations establishment seventy anniversary, Beijing World Women Conference hold twenty anniversary de (particle) occasion...
BT: On the occasion of the 70th anniversary of the founding of the United Nations and the 20th anniversary of the World Conference on Women in Beijing...

Participant	SI
P7	On the seventieth anniversary of the establishment of the UN, *the World Conference on the twentieth anniversary of the World Conference on Women*...

In Example 5.33, the interpreter originally intended to say 'the World Conference on Women', based on the available translation. However, what was not anticipated was that it also included the information of time '20 周年 (twentieth anniversary)' at the end of the sentence. Because such information needs to be placed at the beginning of the phrase in English, the interpreter changed the word order in order to complete the translation. It might be the reason that the interpreter's efforts were allocated to this phrase and '北京 (Beijing)' was not provided in his/her translation.

Example 5.34:

ST: 让我们发扬北京世界妇女大会精神...
Gloss: Let we reaffirm Beijing World Women Conference spirit...
BT: Let us reaffirm the spirit of the World Conference on Women in Beijing...

Participant	SI
P10	So Now let's fully embrace *the Beijing's the World Conference on Women held in Beijing*.

Similar to the previous example, this phrase appeared again in the later part of the speech but without the time phrase. However, '北京 (Beijing)' is usually placed at the

end of the sentence as a prepositional phrase in English. Therefore, it can be seen that the interpreter changed the structure again and repaired it with ‘the World Conference on Women held in Beijing’. However, ‘spirit’ was omitted in the translation probably due to a lack of time and/or effort.

Example 5.35:

ST: 许多以前遥不可及的梦想已经成为现实。 Gloss: Many past far no reach de (particle) dream already become reality. BT: Dreams that were once beyond reach have come true.	
Participant	SI
P2	After the hard work, *the dream seems to seemed to be impossible that seems to be impossible* has been achieved.
P10	With decades of hard work, *a lot of dreams that were to follow to that were too far away from us* now become reality.

Example 5.35 shows the repair related to the translation of the phrase ‘以前遥不可及的梦想’. As shown in the translations, both interpreters chose to translate ‘梦想 (dream)’ first, followed with an attributive clause in order to cope with the syntactic difference. According to P2’s translation, s/he repaired three times. The first attempt was to structure a sentence with ‘the dream’ as the subject and ‘seems to’ as the verb. Afterwards, the interpreter changed to past participle. In the final attempt, s/he used ‘that’ to lead the attributive clause. As for P10, s/he articulated ‘that were to follow to’ first before repairing it with ‘that were too far away from us’.

The next three examples focus on potentially abandoning the first solution to finish the sentence.

Example 5.36:

ST: 第二，积极保障妇女权益。 Gloss: Second, active guarantee woman right. BT: Second, we should protect women's rights and interests.	
Participant	SI
P4	*Second, to we will need to make sure* the rights of women are guaranteed.

The professional interpreter wanted to use the phrase 'to do something' to start this sentence. However, the interpreter changed mind by adding the subject. By comparing the ST and the BT, it can be seen that there is no subject in the original Chinese but subject is added in the English version.

Example 5.37:

ST: ...推动妇女参加社会和经济活动... Gloss: ...promote women participate society and economy activity... BT: ...a higher level of social and economic participation by women...	
Participate	SI
P9	And we should *promote women and to use their talents and to promote [um] to encourage them* to get involved in social development.

In Example 5.37, the interpreter made a series of repairs. S/he wanted to use the conjunction 'and' but repaired it with the addition of the information 'to use their talents'. Then s/he uttered 'and to promote', followed with a filled pause, and changed it to 'to encourage them'. The interpreter did not comment on why 'and' was used in his/her first attempt, but it is likely that the interpreter had a wrong anticipation or interfered with the information '社会和经济活动 (social and economic activities)' while interpreting since there is a conjunction in this phrase.

Example 5.38:

ST: 社会对妇女潜能、才干、贡献的认识仍然不充分。 Gloss: Society to woman potential, talent, contribution de (particle) recognition still not full. BT: Full recognition of women's potential, talent and contribution has yet to be achieved.	
Participant	SI
S10	Women's po- potential, their talent, and their ability is *not a still underestimated*.

In Example 5.38, '仍然不充分' in the ST is in negative form. Based on the articulation provided by the interpreter, s/he attempted to stick to the negative form by coming up with a word but failed to do so. Therefore, the interpreter decided to use 'underestimate' to express the meaning in the lexical retrieval process.

5.2.2.3 Lexical error repairs

In the Chinese to English direction, 18.58% of lexical error repairs were made by student interpreters and 21.64% by professional interpreters. There are two main types of lexical error repairs identified in the corpora: erroneous selection in terms of meaning, part of speech and word component, and in grammar.

Example 5.39:

ST: 虐待甚至摧残妇女的事情时有发生。 Gloss: Abuse even inhuman treatment woman de (particle) thing sometimes happen. BT: Abuses and inhuman treatment of women continue.	
Participant	SI
S5	And [uh] *disputes abuse* is widely present.

In Example 5.39, the speaker mentioned '虐待 (abuse)' in the ST but the interpreter came up with the word 'disputes', which is obviously a wrong articulation

in meaning. The interpreter immediately realised the error and repaired it with the correct word ‘abuse’.

Example 5.40:

ST: ...使妇女成为政界、商界、学界的领军人物。 Gloss: ...make woman become politics, business, academia de (particle) leader people. BT: ...and support them in becoming leaders in the fields of politics, business and academia.	
Participant	SI
P4	...making women become leaders of business, academic academia and other fields.

Though both ‘academic’ and ‘academia’ refer to the same thing, the difference lies in its form because the former word is an adjective and the latter one a noun. As shown in Example 5.40, the interpreter uttered the adjective form first before correcting to the noun form. According to the interpreter’s recollection, s/he struggled with the word ‘attribute’. In comparison with ‘academia’, the word ‘academic’ was more frequently used in his/her vocabulary. In other words, the interpreter was more familiar with the adjective form. This case indicates that part of speech can be an obstacle when interpreters need to retrieve the correct form in the process of SI.

Example 5.41:

ST: 妇女和儿童是一切不和平不安宁因素的最大受害者。 Gloss: Woman and child is all not peace not stability factor de (particle) biggest victim. BT: Women and children are the ones who suffer most when peace or tranquillity is disrupted.	
Participant	SI
P3	Woman is very vulnerable to all types of *disa- disabili- di- dis- distable unstable* factors.

Example 5.41 reflects the challenge that the interpreter was not familiar with the negative form of the word '不安宁 (unstable)' in English. As shown in the translation, the interpreter experienced a series of unsuccessful attempts. It can be seen that the interpreter thought the prefix should be 'dis', which is also a negative form that is frequently used as a prefix in some words. After several attempts, the interpreter finally realised that 'unstable' could be used in the translation.

Example 5.42 below illustrates the repair of grammatical errors, which is only identified in the Chinese to English direction.

Example 5.42:

ST: ...每一位妇女都有人生出彩和梦想成真的机会。 Gloss: ...every one wei (measure word) all have life out color and dream become true de (particle) opportunity. BT: ...every Chinese woman has the opportunity to excel in life and make her dreams come true.	
Participant	SI
P7	...every woman *have has* the opportunity to achieve their dreams.

Given the fact that English is B language for all the participants in this study, grammar mistakes are common in both student and professional groups. When working under high pressure in SI, interpreters are prone to making grammatical errors.

However, not all the participants could repair their grammatical errors, and repairs are largely dependent on their monitoring and available efforts. In Example 5.42, the interpreter started the sentence with ‘every woman’, followed with ‘have’ in a plural form. It might be because in the whole speech, ‘woman’ is usually in the plural form and the interpreter has adapted to plural form. However, this sentence is an exception and the singlular form needs to be used to resemble the ST. After realising the grammatical error, the interpreter repaired it with a single form.

5.2.2.4 Phonetic error repairs

Phonetic error repairs comprise only a small number of repairs with 2.65% made by student interpreters and 6.72% by professional interpreters. There are two categories of phonetic error repairs identified in the corpora: slips of the tongue such as consonants or vowels, and stress.

The first three examples below focus on the discussion of slips of the tongue.

Example 5.43:

ST: ...消除对妇女的歧视和偏见...	
Gloss: ...eradicate to woman de (particle) discrimination and prejudice...	
BT: ...with less discrimination or prejudice against women...	
Participant	SI
S7	...We needs to discri- [ah] eliminate *all fors all forms* of eminit- [um] discrimination against women...

As shown in Example 5.43, it is difficult for the interpreter to provide the long phrase ‘all forms of discrimination against women’. There are two filled pauses and two mid-articulatory repairs. In terms of slips of the tongue, the interpreter wanted to express ‘all forms’ but accidentally said ‘all fors’ with the omission of the consonant ‘m’ in the word.

Example 5.44:

ST: ...特别是要关注农村妇女... Gloss: ...special is need pay attention suburban woman... BT: ...and pay particular attention to the health needs of rural women...	
Participant	SI
S8	We should particularly *foto focus* on women from rural areas...

In Example 5.44, when the participant interpreted '关注 (pay attention to)' into English, s/he wanted to use 'focus on' but uttered 'foto', which is obviously wrong. The interpreter immediately repaired it with the correct pronunciation.

Example 5.45:

ST: ...实施 100 个"快乐校园工程"。 Gloss: ...implement one hundred ge (measure word) "happy campus project". BT: ...and implement 100 "happy campus projects".	
Participant	SI
P9	...to achieve more than a hundred *help [um] happy* campus projects.

Example 5.45 elaborates the situation when the interpreter mispronounced 'happy' with 'help' in the translation. It can be noticed from the articulation that this is a typical repair with the filled pause 'um' as the interregnum and 'help' as the reparandum.

Example 5.46:

ST: 发达国家要... Gloss: Developed country need... BT: Developed countries should...	
Participant	SI
S10	Developed *countries countries* should...

Example 5.46 seems to be a repetition. However, the reason why it belongs to this category is because the interpreter had a problem with the stress of the word 'countries'. What the interpreter pronounced in SI was [kʌn'triz] with the stress on the second syllable. The interpreter realised the error in pronunciation and repaired with ['kʌntriz], which is the correct pronunciation.

5.2.2.5 Mid-articulatory repairs

The highest percentage of repairs in the Chinese to English direction is also mid-articulatory repairs, as in English to Chinese. Compared with professional interpreters, student interpreters had more mid-articulatory repairs (35.84% vs 29.86%). Reasons for triggering mid-articulatory repairs are: (1) to improve appropriateness and avoid ambiguity; (2) to correct identified errors at lexical and phonetic level to complete the sentence.

Example 5.47:

ST: 为支持全球妇女事业和联合国妇女署工作，中国将向妇女署捐款 1000 万美元...	
Gloss: For support globe woman cause and United Nations Women work, China will to United Nations Women donate 1000 ten thousand dollar...	
BT: To support women's development worldwide and the work of UN Women, China will donate US$10 million to UN Women...	
Participant	SI
P7	In China, in order to China will donate ten million *do- US dollars* for this campaign in order to achieve gender equality...

In Example 5.47, the interpreter made an appropriateness-related mid-articulatory repair when s/he articulated '美元 (US dollar)' into English. The interpreter believed that if it is only interpreted into 'dollar', the audience might be confused about the currency because dollar is the name of more than 20 currencies. Therefore, they changed the articulation from 'dollar' to 'US dollars'.

Example 5.48:

ST: ...用于支持落实《北京宣言》...	
Gloss: ...use for support implement Beijing Declaration...	
BT: ...for the implementation of the Beijing Declaration...	
Participant	SI
P4	...to implement the *Beijing Derec-Declaration*...

Example 5.48 shows a mid-articulatory repair related to pronunciation. The interpreter firstly pronounced '宣言 (declaration)' as 'derec-'. Due to the realisation of the phonetic error, the interpreter corrected it to 'declaration' in mid-flow.

Example 5.49:

ST: ...没有妇女解放和进步，就没有人类解放和进步。	
Gloss: ...no woman liberation and progress, just no humanity liberation and progress.	
BT: ...without women's liberation and progress, the liberation and progress of mankind would not be attainable.	
Participant	SI
P7	...without the *li- deli- the liberation* of women, there is no liberation of humanity and progress.

Example 5.49 is a mid-articulatory repair concerning lexical error. Based on the sequence of the utterance, it is assumed that the interpreter wanted to pronounce 'liberation' before having an attempt of changing it to 'deliberation'. According to the interpreter's reflection, s/he was confused about the correct word for '解放 (liberation)' in English because 'liberation' and 'deliberation' are very similar and only differ by one syllable. This is the reason why the interpreter switched from one word to another in mid-flow and finally decided to use 'liberation'.

5.2.2.6 Repair failures

The percentage of repair failures in the Chinese to English direction is higher for the student group at 25.66%. As for professional interpreters, this number is 16.42%, which is 1% higher than that in the other direction. There are also two categories of repair failures in this direction: (1) repaired translations have errors; (2) repaired translations deviate from the meaning of the ST.

The first example below focuses on the discussion of the grammatical errors in repair, which could be found in many repair failures in this direction.

Example 5.50:

ST: 追求男女平等的事业是伟大的。 Gloss: Pursue man woman equality de (particle) cause is great. BT: The pursuit of gender equality is a great cause.	
Participant	SI
S2	*The world for fight for equality* between men men and women.

The interpreter uttered 'for', followed by a repair with 'fight for'. However, the interpreter started the sentence with 'the world' as the subject. In this case, the singular form should be used. It seems that the interpreter's effort focused on repairing the meaning and s/he had less effort available to monitor the grammatical aspect.

Example 5.51:

ST: 从 200 多年前世界第一份妇女权利宣言诞生... Gloss: From two hundred more year ago world the first Woman Right Declaration birth... BT: From the publication of the Declaration of the Rights of Woman over 200 years ago...	
Participant	SI
P3	Since *the rai- the born* of the Declaration of the Rights of Woman...

In Example 5.51, the interpreter repaired the word in mid-flow. Based on the utterance, the interpreter might have wanted to use the word ‘raise’ but this is different from what the speaker wanted to express. S/he changed it to ‘born’ but it is obvious that ‘born’ can only be used as a verb instead of a noun. Therefore, the repair was unsuccessful.

Example 5.52:

ST: 妇女是物质文明和精神文明的创造者，是推动社会发展和进步的重要力量。 Gloss: Woman is material civilization and spirit civilization de (particle) creator, is promote society development and progress de (particle) important force. BT: Women are creators of material and spiritual wealth, and represent an important force driving social development and progress.

Participant	SI
S1	Women is *a creative the civilization* and promote to [oh] the society.

Example 5.52 elaborates the deviation of the meaning after the repair. The interpreter said ‘a creative’ first, then abandoned the first utterance and changed it to ‘civilisation’. However, what the speaker expressed in the ST is that ‘women are the creators of material and spiritual wealth’, and what the interpreter expressed deviated from the meaning of the ST.

5.2.3 Summary

Section 5.2 presented the analysis of different categories of repairs in SI, which include appropriateness repairs, different repairs, error repairs at lexical and phonetic level, and mid-articulatory repairs, as well as repair failures.

The highest proportion of repairs were mid-articulatory, regardless of direction and expertise. This is largely due to the intrinsic feature of SI, that every interpreter is constrained by simultaneity. Therefore, when interpreters realise the potential problems, they immediately start repairing in mid-flow instead of waiting to complete the whole word, phrase or even the sentence. In both directions, the aim of mid-articulatory repairs is either to improve the acceptability or appropriateness or to correct any identified errors at lexical or phonetic level.

Through the quantitative analysis of percentage of each category of repairs, it was found that more appropriateness repairs were made in the English to Chinese direction, regardless of expertise. The aim of making appropriateness repairs is to improve idiomaticity, preciseness and register of the target language. Since all the participants in this study have Chinese as their A language, it is not surprising that interpreters have a higher level of language ability to determine the appropriateness of language use in the English to Chinese direction.

In terms of different repairs, the proportion of different repairs made by student interpreters is about the same in both directions, but professional interpreters made more repairs from English to Chinese. Because different repairs involve restructuring of the information and word order, it was found that interpreters usually either abandoned the first solution to complete the sentence, or abandoned the first alternative, then went back and changed the structure.

Lexical error repairs were the second largest category of repairs for both students and professionals. Unlike student interpreters, professional interpreters had slightly more lexical error repairs in the Chinese to English direction. Similar to the reasons that trigger filled pauses and repetitions in the English to Chinese direction, lexical error repairs focus on the repairs of term, number and word choice (examples discussed in Section 5.2.1.3). In the Chinese to English direction, most of the repairs centre on the word level, such as word choice, part of speech, word component, and also conjugation (examples discussed in Section 5.2.2.3).

Regarding phonetic error repairs, both groups of interpreters repaired more errors in the English to Chinese direction. The causes of phonetic errors are very similar. In both directions, slips of the tongue might be due to consonants or vowels (the tones of a Chinese character in English to Chinese SI vs the stress of English words in Chinese to English SI). It was found once again that interpreters could struggle with the pronunciation of a word with multiple syllables, such as ‘declaration’ in Example 5.48.

Repair failures also comprised a large percentage and student interpreters had more repair failures than professionals in both directions. This indicates that though students showed a tendency to monitor their output in SI, some factors such as available efforts, language skills, and experience restricted their success in completing repairs.

Chapter 6 Discussion

The previous two chapters have presented the quantitative and qualitative analysis of the self-built SI corpora of student and professional interpreters in two directions (EN <> ZH). This chapter discusses the results of the data analysis in relation to the three research questions in this study, which explore the impact of directionality on English <> Chinese SI. To recap, the three research questions are as follows:

(1) To what extent and in what ways does directionality impact the disfluency frequency?

Two disfluency parameters, namely filled pauses and repetitions, were examined. It was found that the filled pauses frequency in the student group was statistically significant in the Chinese to English direction, after the removal of the outliers from the data analysis. As for repetition frequency, no statistical significance was found in either direction for the student group. For the group of professional interpreters, filled pauses frequency and repetition frequency were not shown to be influenced by interpreting direction. Therefore, the results of the quantitative analysis indicate that directionality has an impact on filled pauses only in one direction (EN > ZH) and only in student interpreters.

Through the qualitative analysis of filled pauses, this study found that conceptualising, information density, formulating, syntactic difference and idiosyncrasies were the common factors that could trigger filled pauses. The types of filled pauses identified in the corpora included filler sounds such as '嗯 (um)', '啊 (ah)' in Chinese and 'um', 'ah' in English, and filler words such as '这个 (this)', '那 (that)' in Chinese or 'well' in English. As for repetitions, this study found that there were three main types of repetitions in both interpreting directions, which entailed part-word repetitions, whole-word repetitions and phrase repetitions. It also found that repetitions, apart from being a signifier of a cognitive problem, could also function as a buffer to give interpreters more time to think about the interpretation.

(2) To what extent and in what ways does directionality impact the repair frequency in SI?

The results of the quantitative analysis indicate that directionality does not have an impact on repair frequency in either group of interpreters. The qualitative analysis examined different types of repairs (appropriateness repairs, different repairs, phonetic and lexical repairs, mid-articulatory repairs) and repair failures. The results show that

mid-articulatory repairs were the largest group of repairs made by both groups of interpreters in both directions. This is because when interpreters do simultaneous interpreting, they monitor their output while listening and speaking. These actions occur concurrently. Therefore, interpreters need to repair the errors once they find the errors, given the time constraint. Otherwise, more efforts need to be made if they utter the whole word or phrase, which could consequently cause further saturation of their interpretation.

(3) To what extent does the performance of interpreters between the two groups differ under the impact of directionality?

The results of the quantitative analysis indicate that expertise has an impact on repetitions and repair frequency. This impact differs according to interpreting direction: professional interpreters had fewer repetitions in the English to Chinese direction, and less repair frequency in the Chinese to English direction than student interpreters. Otherwise, no statistically significant differences were found between these two groups in this respect.

The following sections discuss the implications for directionality and corpus-based interpreting studies of these findings.

6.1 Directionality and disfluency

As discussed in Section 2.4.3.1, there are four fundamental components in Gile's (2009a) Effort Models, including Listening and Analysis (L), Production of the Source Speech (P), Short-term Memory Effort (M) and Coordination (C). When the available efforts do not meet the required processing capacity, cognitive saturation and failure occur, which are due to a need for an increase in processing capacity as well as signal vulnerability. Disfluencies such as filled pauses and repetitions are the representation of the increased cognitive load. This section discusses the findings for directionality and disfluencies from the perspectives of comprehension and production.

To recap, L effort involves all the operations related to comprehension. As pointed out in Section 1.2.1, comprehension is a very important process in interpreting as understanding the messages delivered by the speaker is a prerequisite of interpreting. Comprehension process entails two categories, namely micro- and macro-operations (Ericsson & Kintsch, 1995; Van Dijk & Kintsch, 1983). Taking the impact of directionality into consideration, Padilla (2005) points out that there are a few aspects that interpreters might be sensitive to in the comprehension of two language directions.

P effort deals with the production part in SI. For the aspects that influence the comprehension process from one language to the other or vice versa, these aspects also have an impact on the production process.

Based on what Gile (2009a) previously summarised in the processing capacity-related problems, this study finds that interpreters might encounter different problems in both comprehension and production, and these problems become the triggers for disfluencies in SI. In most cases, triggers that cause the occurrence of disfluencies in both interpreting directions share similarities. However, there are still some phenomena that are only reflected in one interpreting direction.

The first trigger is sociolinguistic aspects of language. The distance or proximity between cultures and their forms can influence comprehension. Given the fact that Chinese is the A language and English the B language for all the participants in this study, this trigger is reflected more explicitly in the analysis. For instance, Examples 4.1, 4.2, 4.36 and 4.38 shown in Chapter 4 indicate that unfamiliarity with the culture of the source language can give rise to difficulties in the understanding of the source text, which can cause filled pauses and repetitions in SI. However, in Chinese to English SI, the source language does not bring any obstacles to the comprehension process and what interpreters focus on is the logic analysis, as evidenced by Example 4.18. In this process, interpreters dive deep into the understanding of the source text in Chinese and judge if any information is against their knowledge at macro level, based on the context.

The second trigger is the influence of syntactic difference, which can affect both comprehension and production in both directions. In the English ST used in this study, there are many sentences that are composed of clauses or comparative structures. The fact that in English the clause follows directly after the word it modifies makes it difficult to structure a sentence in the same way into the target Chinese language, and interpreters need to use the salami technique to segment the sentence in SI. However, because many interpreters, especially student interpreters, tend to keep a short EVS and follow the ST closely, they may not be able to have a clear picture of the syntactic structure. A professional interpreter reported that s/he liked to shorten the EVS when s/he was a student because it would help to mitigate the memory burden and largely avoid information loss. However, with the increase of real-life experience, s/he found short EVS could potentially lead to an unnatural interpretation and increase the risk of

structural change at sentence level. In this case, disfluencies are prone to appear, such as examples discussed Section 4.3.1.4. In Chinese ST, the head noun usually appears after a long chunk of modifiers, as shown in Section 4.3.2.4. In most cases, this requires interpreters to either wait until the head noun appears before starting the interpretation or process the information as much as possible by restructuring the sentence.

The third trigger is the perception of words, such as the extent of familiarity and similarity. This trigger poses great challenges in the production process in both directions. Taking the interpretation of unknown words, for example, interpreters may not be able to accurately provide an expression for a term such as the name of foundations and organisations, which is reflected in Examples 4.6, 4.7, and 4.30 in the English to Chinese direction, and Examples 4.22 and 4.50 in the Chinese to English direction. Therefore, filled pauses and repetitions identified and discussed in these examples represent the saturation of interpreting. However, Díaz-Galaz, Padilla and Bajo's (2015) study mentions that both experienced and inexperienced interpreters benefit from the access to preparation materials such as slides, speech scripts and glossary. Given the fact that all interpreters were given enough time to prepare and provided with a glossary in each direction, this study demonstrates that interpreters could benefit from glossary preparation in both directions because such preparation can enhance to some extent the accuracy level of interpretation of terms, as evidenced by Example 4.22.

The fourth trigger refers to the problems related to signal vulnerability, such as the interpretation of numbers. Several examples, such as Examples 4.32, 4.33 and 4.57, show that unit conversion from either English to Chinese or Chinese to English can cause the occurrence of disfluencies in SI. Apart from unit conversion, simple numbers such as years can also lead to extra processing effort, and interpreters were also likely to have disfluencies in their interpretation.

The last trigger is information density. STs in both directions have parallel structures and interpreters' performance reflected that information density could cause an increased requirement of processing capacity. When the required processing capacity is more than the available processing capacity, the performance is seriously affected, and such influence is reflected in sections 4.3.1.2 and 4.3.2.2.

Apart from the triggers mentioned above as cognitive problems, this study indicates that filled pauses, as one of the disfluencies, can be idiosyncrasies. In other

words, the use of filled pauses is habitual, and it has become interpreters' unconscious reaction, but interpreters may barely regard or realise filled pauses as disfluency, such as the cases analysed in Section 4.3.1.5. This finding is in line with the previous studies (He, 2007; Wang & Li, 2015) related to filled pauses as habitual use in interpreting. Further evidence found in this study was that some interpreters tend to start the sentence with filled pauses, as discussed in Section 4.3.1.5, but this phenomenon is restricted to the English to Chinese direction.

To sum up, the findings of the present study regarding disfluencies confirm the factors that can hinder the process of comprehension and production proposed by Gile (2009a) and Padilla (2005) in European languages. This study further provides empirical evidence of processing-capacity problems in the English-Chinese direction.

6.2 Directionality and repairs

The analysis of repairs in this study was informed by the theoretical frameworks of Levelt (1983), Kormos (1999) and Petite (2005), thus incorporating monitoring and self-repair in speech into interpreting studies. The findings showed that although repair frequency was not influenced by directionality for both groups, each category of self-repairs made by both groups of interpreters and its distribution were different. At the same time, the motivations for making repairs showed some similarities between the two directions. This section further discusses each category of repairs from the results presented in Chapter 5.

6.2.1 Repair structure

As discussed in Section 3.2.3, the study investigated three major types of repairs, including post-articulatory repairs (appropriateness repairs, different repairs, error repairs at lexical and phonetic level), mid-articulatory repairs, and repair failures. According to the structure of repairs (shown in Figure 3-1), repair consists of original utterance (reparandum), editing term (interregnum), and repairs. Based on the current structure, this study finds that there were mainly three types of variants of structure of repairs in SI corpora between the two directions.

The first type of structure is the same as that discussed in Figure 3-1, which consists of original utterance, editing term and repairs. For example, Example 5.10 in Section 5.2.1.2 showed that the original utterance (reparandum) was '他 (he)', followed with a filled pause '嗯 (um)' as the editing term (interregnum) before the repair '我非常感谢他 (I want to thank him)' appeared. This is a typical structure that

is in line with the repair structure in speech proposed by Levelt (1983). Besides this, it was also found that there could be more than one editing term (reparandum), such as Example 5.5.

The second type of structure is similar to the first repair structure but the editing term (interregnum) is omitted. Based on the examples that were discussed in Section 5.2, it was found that in most of the cases, the editing term was omitted, and it seems that interpreters preferred to directly repair the original utterance. The possible reasons might be twofold: (1) uttering the editing term could be time-consuming given the fact that any unnecessary utterance could put interpreters at the risk of losing capacity and efforts to focus on the incoming message; (2) when interpreters notice the places where repairs could be made, they already have an idea on how to implement the repairs.

The third type of structure is what is newly found in this study – repetitions can also exist in the repair structure. For instance, S7's interpretation shown in Example 4.33 demonstrates this type of structure. The interpreter uttered 'the fourth Women Status Com- Com- [well] [well] Conference on Women'. This is a mid-articulatory repair with both repetitions and filled pauses. The original utterance was 'the fourth Women Status Com- Com-'. Based on this, it is assumed that the interpreter wanted to say 'committee'. The utterance was followed with two editing terms (interregnum) before the interpreter repaired it into 'Conference on Women'. Therefore, the structure is shown as: original utterance (reparandum) + repetition of part of original utterance (reparandum) + editing term (interregnum) + repair.

6.2.2 Repair types and motivations

As shown in Table 5-11, in terms of repair types in relation to the impact of direction, both groups show that appropriateness repairs, different repairs and phonetic error repairs were more in the English to Chinese direction while repair failures are more frequent in the Chinese to English direction. As for lexical error repairs, students made more repairs in the English to Chinese direction, while professional interpreters had more repairs in the other direction. Regarding mid-articulatory repairs, professional interpreters had more repairs in the English to Chinese direction while student interpreters repaired more frequently in the other direction.

This study finds that the interpreters better monitored the appropriateness into the Chinese target language. Motivations for taking appropriateness action include idiomaticity, added output, preciseness, and register in the English to Chinese direction.

However, interpreters seemed to only work on the improvement of idiomaticity and preciseness, but other motivations identified such as added output or register were not discovered in the Chinese to English direction. Specifically, in the English to Chinese direction, interpreters preferred to use Chinese four-character idioms, while in the other direction, interpreters strived to use efficient language to express what was delivered in the source speech without considering English idioms. The main reason is most probably that Chinese is the A language for all participants. Therefore, it is not surprising that participants had a strong language skill in this direction and can notice and monitor the nuances more easily. The analysis of appropriateness repairs shows that interpreters tried to achieve the accuracy and preciseness of the language by avoiding ambiguity. At the same time, when they realised the messages they delivered were not explicit enough, they might add some information that did not completely resemble the original sentence in order to achieve the contextual effect (e.g., Examples 5.3 and 5.4).

The aim of making different repairs is to have an easier or more effective arrangement of messages (e.g., Kormos, 1998; Levelt, 1983, Petite, 2005). Different repairs demonstrate how interpreters survive through repairs (Petite, 2005). The current study finds that the methods of making different repairs in both English to Chinese and Chinese to English directions confirm the findings of Petite's study (2005). These methods include either abandoning their first solution to achieve completion or abandoning their first alternative to go back and change the structure. Based on the corpus, this research agrees with Petite's idea that there is also a backward-looking process in simultaneous interpreting. This means when interpreters realised their first solution was not appropriate, they changed the structure and repaired what they uttered earlier.

Mid-articulatory repairs are the most frequent repairs that both student interpreters and professional interpreters made in both directions. The motivations for making mid-articulatory repairs include improving appropriateness or acceptability and correcting errors at lexical or phonetic level. Both motivations aim at completing the sentence. As mentioned in Section 1.2.2.2, interpreters have the control of output monitoring by either proceeding or halting based on the satisfaction of the output as well as the operational memory. The percentage of mid-articulatory repairs among all types of repairs showed that both professional and student interpreters seemed to make repairs

within the mid-articulatory loop instead of post-articulatory process and such preference applied to both interpreting directions.

As for lexical and phonetic repairs, this study demonstrates that lexical availability becomes an obstacle for both groups of interpreters. Working under time constraint makes interpreters not have enough time to quickly retrieve the words they store in their knowledge system. In terms of phonetic errors, the study finds that interpreters were more likely to pronounce wrong tones or have slips of the tongue with consonants or vowels in the English to Chinese direction. In the other direction, apart from slips of the tongue with consonants or vowels, interpreters also mispronounced the stress of a word with multiple syllables. Such difference is caused by the features of the English and Chinese languages. As mentioned in 1.2.3.1, the difference between the Chinese and English languages is that Chinese is based on characters and one character is one syllable, while an English word can be made up of either one syllable or multi-syllables. For the phonetic errors that were made by the interpreters in the Chinese to English direction, most of them were words with multiple syllables. Therefore, word stress could be a problem in interpretation. As Chinese is a tonal language, tone accordingly becomes the problem in interpretation in the English to Chinese direction.

In terms of repair failures, this study finds that both groups of interpreters have a higher chance of unsuccessful repairs in the Chinese to English direction, but this chance is lower in the professional group. The repaired interpretations either contain errors in grammar or deviate from the original meaning delivered in the speech. Besides, failures mostly happen in the production process. There are several reasons that caused repair failures in both directions. First, when interpreters have the motivation to repair, that means interpreters believe they have available efforts to take this action. However, factors such as syntactic difference (e.g., Example 5.23) and signal vulnerability in numbers (e.g., Examples 5.24 and 5.25) lead to repair failures. Besides, the allocation of efforts in repairs is disproportional. Grammatical errors found in the examples (e.g., Examples 5.24 and 5.42) show that when interpreters decided to make repairs, grammar was usually sacrificed. This is likely because interpreters fully focused on the repairs and no available effort could be allocated to monitor grammar. It is also interesting to find that, in this study, some of the repair failures (e.g., Example 5.25 and 5.26) were mistakenly made because interpreters did not realise the first solution was correct. Based on the interpreters' recollections, the

problem may lie in listening and analysis. When interpreters articulated the interpretation, they might not have clearly heard a word in the source speech. Therefore, this caused confusion because they were not sure if the word they heard was correct or not. Consequently, the first solution was correct, but interpreters instinctively repaired the correct version and caused a repair failure.

6.3 Directionality and expertise

Through the analysis of differences in disfluencies and repairs between student interpreters and professional interpreters in two directions, this study finds that student interpreters and professional interpreters evidence differences and they also share similarities in some aspects in both directions. This section further elaborates this, based on their performance in disfluencies and repairs.

In the analysis of filled pauses frequency, the results show that there is a statistical significance between student interpreters and professional interpreters after the removal of outliers from the student group in the English to Chinese direction. Previous studies on pauses (e.g., Wang & Li, 2015; Yang & Deng, 2011) demonstrate that professional interpreters have fewer pauses than student interpreters. This study found that the mean frequency of filled pauses in the professional group was not necessarily lower than that in the student group in the English to Chinese direction.

The reasons behind the difference between the results of the current study and previous studies could be related to methodology, i.e., the types of pauses that are included for analysis might be different in each study. More specifically, as mentioned previously, the study of unfilled pauses is better carried out under the condition of recording both original speech and interpretation in a dual track in a sound-proof environment. Otherwise, it is not possible to accurately determine the EVS and analyse reasons for causing unfilled pauses. Therefore, the current study only focused on the analysis of filled pauses. Yang and Deng's study (2011) on decision-making processes of expert and novice interpreters also analysed their pauses in both English to Chinese and Chinese to English SI, but they did not define specifically the types of pauses that are involved in the analysis. In this case, it is not possible to determine whether the conclusion of their study applies to all the types of pauses. Though Wang and Li (2015) divided pauses into filled pauses and unfilled pauses, the conclusion of their study is based on the pauses in total instead of for filled pauses.

In addition, a few studies (e.g., Cecot, 2001; Wang & Li, 2015) show that disfluencies such as filled pauses are part of interpreters' own way of speaking, which can also be referred to as idiosyncrasies, and the occurrence of pauses for each subject could be an individual feature. If filled pauses are frequently used as a language behaviour, such action could cause the increase in the total number of filled pauses in this group. As discussed in Section 4.3.1.5, two professional interpreters were found to use filler word '那 (well)' frequently at the beginning of a sentence, but this was not found in the student group in the English to Chinese direction. This could have contributed to the higher mean frequency of filled pauses in this direction among the professionals.

In terms of repetition frequency, this study found that student interpreters had higher repetition frequency in the English to Chinese direction than professional interpreters, but not in the other direction. Additionally, students frequently used part-word and whole-word repetitions, while the percentage of phrase repetitions was higher in the professional group in both directions. Though the quantitative analysis shows a difference in the use of repetitions between the two groups, the qualitative analysis reveals that both groups of participants did share similarities in using repetitions. Similar to filled pauses, repetitions indicated cognitive problems in the on-line planning of the discourse. Examples discussed in Section 4.5 show that both professional interpreters and student interpreters can face similar challenges with terms, numbers, syntactic differences, and so on. According to Cecot (2001), repetitions could be used as a signal to indicate the need to plan the discourse as well as a strategy or device to gain time to cope with the time pressure. By taking those examples into consideration, what professional and student interpreters did is consistent with what Cecot proposes. For instance, interpreters were able to add further details after repetition.

As for repairs, student interpreters had a higher repair frequency in the Chinese to English direction but not in the other direction compared with professional interpreters. This showed that student interpreters made more errors in this direction, but at the same time they also made relevant repairs through their monitoring. However, in terms of the distribution of each types of repairs shown in Table 5-11, the results showed that professional interpreters had an overall high monitoring ability in taking post-articulatory repairs related to language appropriateness, errors, and sentence structure

in both directions. In contrast, students focused more on taking mid-articulatory repairs in both directions.

The results on self-repairs of the present study are slightly different from one of the findings from a study of professional interpreters and student interpreters in Chinese to English consecutive interpreting conducted by Shen and Liang (2019). They found that the professional group had fewer different repairs in Chinese to English consecutive interpreting due to more attention to proficiency in syntactic structure conversion. This is mainly caused by the different nature of consecutive interpreting and simultaneous interpreting. As discussed in Section 1.1.2, in CI interpreters hear a short passage of up to several minutes in one go and can use the aid of a notebook. Syntactic differences caused by two languages can be immediately noticed and analysed before producing the interpretation. However, SI focuses on simultaneity and it is not possible to listen to the whole sentence before uttering the output. Therefore, anticipating the syntactic structure every time is not possible. Instead, the higher percentage of different repairs found in the professional group demonstrates that professional interpreters had a higher level of language skills and could flexibly manipulate the sentence structure within their capable efforts.

6.4 Summary

This chapter discussed the impact of directionality from three perspectives: disfluencies, repairs, and expertise. It revisited the Effort Models by pointing out triggers that cause disfluencies such as filled pauses and repetitions. It also discussed repair structures that were found in this study as well as repair types and motivations. Finally, it focused on the performance of professional and student interpreters regarding directionality. The final chapter sets out the conclusions of the study, and its implications as well as thoughts on potential future research.

Chapter 7 Conclusion

This study investigated the impact of directionality on English<>Chinese SI by using self-built corpora. In the previous chapter, the findings of the study are presented and discussed from both quantitative and qualitative perspectives. This chapter focuses on the following aspects: (1) the summary of how the research aims and objectives have been addressed; (2) the significance and implications of the findings; (3) limitations of the present study and potential future research.

7.1 Summary of the study

As stated in Chapter 3, the overarching aim of this research was to investigate the impact of directionality on the English<>Chinese SI performance of student and professional interpreters. This impact was investigated through disfluencies and repairs.

The first research question focused on the effect of directionality in terms of disfluencies. The analysis of the quantitative data indicates that the student group was influenced by directionality in filled pauses but not repetitions, and that filled pauses appear more frequently in the Chinese to English direction. However, filled pauses and repetitions produced by professional interpreters showed no statistical difference in either directions. The findings of the qualitative data show that several factors influenced the comprehension and production process in English<>Chinese SI in both directions. These factors notably included sociolinguistic aspects of language, syntactic difference, and information density, among others. Due to these factors, there were disfluencies and directionality influenced the proportion of occurrence of disfluencies.

The second research question focused on the effect of directionality in terms of repairs. The analysis of the quantitative data finds no evidence that repair frequency was influenced by directionality in either of the groups. However, the examination of the different categories of repairs revealed that more repairs occurred in the English to Chinese direction, and more repair failures occurred in the Chinese to English direction. This was largely due to both groups having a stronger monitoring of their A language over their B language. Additionally, participants in both groups had more mid-articulatory repairs than other categories of repairs.

The third research question explored the effect of directionality across the student interpreter and professional interpreter group. In the English to Chinese direction, this

study found that student interpreters and professional interpreters showed differences in repetition frequency (student interpreters repeated more frequently), but this difference was not attested in filled pauses frequency and repair frequency. Through the investigation of the types of disfluencies and repairs, it was found that student interpreters had more part-word and whole-word repetitions, but professional interpreters had more phrase repetitions. This might indicate that professional interpreters tended to make their interpretations more coherent than student interpreters. As for repairs, shown in Table 5-11, the differences lie in that professional interpreters had more appropriateness repairs, different repairs, phonetic error repairs, but fewer lexical error repairs and repair failures. In the Chinese to English direction, the findings showed that repair frequency was different across these two groups and student interpreters repaired more frequently. However, no statistical significance was found in filled pauses frequency and repetition frequency. The analysis of the corpora showed that professional interpreters still had more phrase repetitions but fewer part-word and whole-word repetitions than student interpreters. With regard to repairs, student interpreters had more mid-articulatory repairs and repair failures, in comparison with professional interpreters.

7.2 Contributions and implications

As discussed in Section 2.4, scholars of the Paris school (Déjean Le Féal, 2005; Donovan, 2005; Seleskovitch, 1968) are strongly against into-B language interpreting because they think this activity is believed to be more demanding, more stressful and more prone to errors. However, as Donovan (2005) mentions, both institutional and private markets need interpreters to be able to interpret in both directions. This is confirmed by the answers of the professional interpreters to the questionnaire, who in most cases report that are usually required to produce SI service in both directions, showing that into-B language interpreting is also demanded in the Chinese market. Therefore, the study of directionality allows us a better understanding on how interpreting into A language and into B language differ. Based on the professional interpreters' performance, the current study shows that skilled interpreters also have a good monitoring of their B language, to some extent refuting the position of the Paris school.

Many available studies on directionality are restricted to European languages, such as English, Spanish, and Italian (e.g., Bartłomiejczyk, 2006; Monti et al., 2005). These

studies focus on discussions of the interpreting process and production, interpreters' preference of interpreting direction and teaching interpreting into a B language. As for studies on directionality in English-Chinese, there are only a few (e.g., Chang, 2007), which mainly focus on the impact of language direction on their choice of strategies, such as omissions and compression. This study enhances and complements existing research on directionality by investigating it from the perspectives of disfluencies and repairs in the English-Chinese language pair.

Although there are recent studies on disfluencies and repairs in the English and Chinese language pair, they only focus on one direction, namely English to Chinese (e.g., Han, 2015; Zheng & Zhang, 2019) or Chinese to English (e.g., Wang & Li, 2015). This study fills the gap in this field by investigating the impact of directionality on the performance of interpreters. In other words, the problems of disfluencies and repairs are examined in both directions instead of only one direction. Besides this, the design of the study reduces the variability across the two directions caused by variables such as accents, speech rates, and materials, as discussed in 1.2.3 and 3.3.3.

In contrast to previous empirical research using experimental materials designed specifically for a research aim, this study builds a corpus which is composed of two sub-corpora by using authentic recorded speeches. As discussed in Section 3.2.2.2, ad hoc interpreting corpora built by individual researchers for manual analysis could complement the current corpus-based interpreting studies (Russo et al., 2018, p. 4). In this study, the recordings of translated material in the corpus of English to Chinese SI amount to 152.67 minutes for the student group and 152.933 minutes for the professional group, and those in the corpus of Chinese to English SI amounts to 111.87 minutes for the student group and 111.55 minutes for the professional group. Therefore, this is a sizeable corpus that could provide reference for the creation of corpora used for studying English-Chinese simultaneous interpreting.

Some of the existing studies (e.g., Dillinger, 1994; Yudes et al., 2013) which adopt an expert-novice paradigm do not explicitly provide the level of expertise for professional practitioners. In contrast, this study follows a clear criterion in terms of defining professional and student interpreters. Other studies that do provide the level of expertise use professional interpreters who work for international organisations or had at least five years' experience (Mead, 2002; Wang, 2014). Although the professional interpreters that participated in the current study only had an average of

3.5 years of experience, the current study demonstrated that their performance was already different from the student interpreters with regard to disfluencies and repairs. According to the professional interpreters' interview, some interpreters reflected that the accumulated experience as well as reflection towards their real-life interpreting performance help them cope with the challenges.

To sum up, through the comparison of the two groups of interpreters, this study provides a thorough picture of the influence of directionality on English-Chinese SI as well as the differences and similarities in performance between the two groups. A deeper understanding of the effect of directionality on performance is important because, regardless of the position of the different schools of thought, the market demands interpreters who work with this language pair to be prepared to offer interpretations in both directions. Therefore, it is of some concern that the results of this study show that students perform less satisfactorily in Chinese to English SI. As well as lack of experience, there might be two potential reasons related to interpreter training that are holding students back.

Firstly, there is not enough practice in interpreting into B language in class. SI interpreting training offered by the universities where the participants were recruited is restricted to two contact hours per week. According to the questionnaires analysed in Section 3.4.3.2, eight students reported that they usually received less than one hour of SI practice for each direction. As for after class practice, it is usually restricted to no more than two hours for each direction. According to Déjean Le Féal (2005), interpreting into the B language is difficult because of the weakness of acquisition of the B language. From the present study, we can see that though student interpreters had a good acquisition of B language, problems reflected in disfluencies and repairs indicate that more time should be dedicated to A-to-B interpreting in teaching and training, especially in helping students have a deeper understanding of the differences between two languages in terms of language use and culture.

Secondly, students lack enough support in interpreting into B language and this is especially true when students practise Chinese to English SI themselves. As Donovan (2005) notes, expression, self-monitoring and redundancy are the issues in interpreting into B language. According to participants' reports, not all the universities where participants were recruited have language experts with English as A language and Chinese as B language. This means that students might not receive professional

guidance and feedback in class. Besides, students also struggled with their expressions when they practised themselves, especially when the Chinese materials they used in practice did not have an English translation. In this case, students cannot monitor their idiomaticity. Therefore, this study indicates that training and teaching in this aspect needs to be enhanced from the perspective of language professionals/trainers and training materials. For instance, when universities provide English-Chinese interpreting modules, students should ideally be provided with one language professional/trainer who has Chinese as A language and English as B language and one with English as A language and Chinese as B language. If it is not possible, native speakers of the target interpreting direction can act as audience to provide feedback on the quality of the target language. As for training materials, trainers could either use on-line websites (e.g., TED talks) which offer translations in multiple target languages as a reference for checking interpreting accuracy or devote more time to preparation work to provide answers for any materials that do not have available translations.

Also, common processing capacity-related problems reflected in both directions showed that student interpreters need to be equipped with certain strategies to cope with the challenges in SI. For example, when professional interpreters encountered parallel structures, they adopted generalisation as a strategy and allocated more efforts to comprehension and analysis of the latter information. Compared with student interpreters, this demonstrates that professional interpreters had acquired a set of strategies to solve the challenges posed by SI and directionality. According to the researcher's knowledge, not all trainers teach interpreting strategies such as the chunking, anticipation, and simplification discussed in Section 1.2.6 in class and they prefer to ask students to explore by themselves. Based on the performance of professional interpreters, strategies turned out to be helpful and they can help students better solve the problems they encounter in SI tasks. Therefore, it is worth teaching these strategies in class and asking students to practise by using these strategies after class.

7.3 Limitations and potential future research

Participants are an important factor in doing interpreting research, especially empirical studies. Three aspects related to the participants from this study could be further developed in future research. First, the present study built a corpus for manual analysis, and from the statistical analysis we can see that the outliers have a disproportionate

effect on the results due to the small number of participants. Therefore, given the corpus-based interpreting studies as a backdrop, it would be meaningful to continue the research by increasing the number of participants. In this way, the impact of outliers on results could be minimised.

Secondly, this study recruited professional interpreters with an average of 3.5 years' experience. From the current results, some of the differences between two groups such as the impact of directionality on the frequency of filled pauses could not be observed. Although recruiting professional interpreters to participate in experiments is very difficult, it is still worth considering including more experienced professional interpreters (e.g., more than ten years' experience) to further study the impact in this aspect.

Thirdly, finding interpreters who have English as A language and Chinese as B language is always a difficulty when studying directionality in this language pair. Historically speaking, Chinese professional interpreters who work at the UN in this language pair are usually asked to interpret in both directions due to politicians' preference. Though many people learn Chinese, those who pursue careers in this field are very few. From the market perspective, interpreting jobs related to this language pair are usually offered in China rather than elsewhere in the world. All three aspects mentioned above contribute to the difficulty of finding interpreters with this profile. Nevertheless, it would still be interesting to compare how interpreters' performance differs between interpreters who have English as A language and Chinese as B language and vice versa.

Concerning the building of an interpreting corpus, incorporating more topics as STs to investigate the differences in performance could provide further and deeper understanding of the impact of directionality on interpreting. For example, the European Parliament Interpreting Corpus (EPIC) mentioned in Section 3.3.2.2 is used in interpreting research and it includes topics in more than 20 domains, such as international relations, education and communications, finance, trade, and so on. Given the time constraint for completing the current research, it only covers the field of gender equality. However, in future research, a wide range of topics in other domains could be selected and added to the corpus to see whether the results obtained in this study can be replicated. What is more, this study only examined filled pauses and repetitions as the representatives of disfluencies. Previous studies (e.g., Wang &

Li, 2015) showed that professional interpreters use more unfilled pauses than student interpreters do. Therefore, other disfluencies such as unfilled pauses could also be studied in future research to complement the findings of the current study.

To conclude, this study investigates the impact of directionality on English<>Chinese SI with the self-built corpora. Based on the qualitative and quantitative analysis of disfluencies and repairs, it appears that directionality influences interpreters' performance, but to a lesser extent than previously assumed. However, with the accumulation of experience and skills/interpreting strategies acquired, interpreters can cope successfully with the challenges caused by directionality.

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Appendices

Appendix I: Questionnaire for student interpreters

I. Personal Background Information

1. What is your age?

A. 18-24 years old

B. 25-34 years old

C. 35-44 years old

D. 45-54 years old

E. Over 55

2. What is your gender?

A. Male B. Female C. Prefer not to answer

2. What is the highest degree or level of school you have completed?

A. Bachelor's degree

B. Master's degree

C. Doctorate degree

D. Others, please specify.....

3. How long have you been learning English?

4. Have you ever taken any English language tests (e.g., IELTS, TOEFL)? If yes, please specify the overall score and the score of each task (e.g., IELTS 8; Listening 8; Reading 8; Writing 8; Speaking 8).

5. Have you ever used English as your working language, if yes, for how long?

II. Interpreting Background Information

1. How long have you received the simultaneous interpreting training in the following language directions?

English to Chinese:____term(s)

Chinese to English:____term(s)

2. How many teaching/training hours per week are there in your simultaneous interpreting module?

3. How many hours per week on average do you practise English to Chinese simultaneous interpreting **in class**?

A. Less than 1 hour

B. 1 to 2 hours

C. 2 to 3 hours

D. Over 3 hours

4. How many hours per week on average do you practise Chinese to English simultaneous interpreting **in class**?

A. Less than 1 hour

B. 1 to 2 hours

C. 2 to 3 hours

D. Over 3 hours

5. How many hours per week on average do you practise English to Chinese simultaneous interpreting **after class**?

A. Less than 1 hour

B. 1 to 2 hours

C. 2 to 3 hours

D. Over 3 hours

6. How many hours per week on average do you practise Chinese to English simultaneous interpreting **after class**?

A. Less than 1 hour

B. 1 to 2 hours

C. 2 to 3 hours

D. Over 3 hours

7. Which language direction in simultaneous interpreting do you think you work well?

A. English to Chinese

B. Chinese to English

C. Equally well

D. Not Sure

Appendix II: Questionnaire for professional interpreters

I. Personal Background Information

1. What is your age?

A. 18-24 years old

B. 25-34 years old

C. 35-44 years old

D. 45-54 years old

E. Over 55

2. What is your gender?

A. Male B. Female C. Prefer not to answer

3. What is the highest degree or level of school you have completed?

A. Bachelor's degree

B. Master's degree

C. Doctorate degree

D. Others, please specify.....

4. How long have you been learning English?

5. Have you ever taken any English language tests (e.g., IELTS, TOEFL)? If yes, please specify the overall score and the score of each task (e.g., IELTS 8; Listening 8; Reading 8; Writing 8; Speaking 8).

6. Have you ever used English as your working language, if yes, for how long?

II. Interpreting Background Information

1. Have you ever had any simultaneous interpreting training? If yes, how long did you receive simultaneous interpreting training before becoming a professional interpreter?

2. Have you ever received any interpreting certificates/qualifications, e.g., from universities, from training organizations or from translation and interpreting organizations?

A. No

B. Yes, please specify……

3. How long have you been working as a professional interpreter?

4. How many days per year on average do you provide simultaneous interpreting?

A. Below 20 days

B. 21-40 days

C. 41-60 days

D. 61-80 days

E. Over 80 days

5. Of these assignments, what is the percentage of English to Chinese simultaneous interpreting?

A. Less than 25%

B. 26%-50%

C. 51%-75%

D. 76%-100%

6. Of these assignments, what is the percentage of Chinese to English simultaneous interpreting?

A. Less than 25%

B. 26%-50%

C. 51%-75%

D. 76%-100%

7. Which language direction in simultaneous interpreting do you think you work well?

A. English to Chinese

B. Chinese to English

C. Equally well

D. Not Sure

Appendix III: English speech

Oh, thank you! I certainly feel warmly welcomed. And I'm delighted to be here with all of you. I want to thank the Secretary-General for his leadership on these issues over the year of his tenure. We greatly appreciate it --- everyone in the United Nations, Commission on the Status of Women, UN Women, the UN Global Compact --- for holding this gathering which comes at such a pivotal moment in the cause of gender equality. I think it's fair to say we are here to build on the progress of the past and seize the promise of the future. And it is an honor, as I look across this hall to see so many leaders from business, diplomacy, government, civil society, a real gathering of those who share this commitment. I wanna thank you all, each and every one of you, because women and men who understand that gender equality is not just morally right but is the smart thing to do are growing in number.

We may be approaching in some areas critical mass, but we have to keep making the same case over and over again. What we are doing here today is smart for companies and smart for countries. That is the wisdom behind the Women's Empowerment Principles. So thank you. Thank you all for your leadership. Now, some of you, as I gaze out, were with me in Beijing back in 1995 at the 4th World Conference on Women, where remarkably representatives from 189 nations pledged to work for an ambitious goal---the full participation of women and girls in every aspect of society. Together, as the Secretary-General said, we called out with one voice, human rights are women's rights, and women's rights are human rights, once and for all, and the world began to listen.

Out of Beijing came the Platform for Action. And in many parts of the world, it was an organizing document. Women and men could see what needed to be done and where they could help to make change happen. In the years that followed, we not only saw change across the world, we saw the creation of UN Women and the passage of Security Council Resolutions, recognizing the crucial role of women in peace-making and security. We saw institutions like the World bank and the International Monetary Fund focus on the untapped potential of women to drive economic growth and social progress. We passed laws, prohibiting violence against women, electing women at all levels of government, working together to make significant strides in closing gaps in

health and education. Now, 20 years later, it is not only time to take stock, but it is our job to keep the ambition of Beijing alive to keep marching forward.

Yesterday, the Clinton Foundation and the Gates Foundation announced a sweeping new report that marshals 20 years of data from around the world to document how far we've come and how far we still have to go. All the evidence tells us that despite the obstacles that remain, there's never been a better time in history to be born female. A girl born in Lesotho 20 years ago could not hope to one day own property or sign a contract. Today, she can. If she were born in Nepal or Afghanistan, there was a tragically high chance that her mother would die in childbirth. Today, that is far less likely. A girl born 20 years ago in Rwanda grew up in the shadow of genocide and rape. Today, she can be proud that women have led the way out of that dark time, and now there are more women serving in her country's parliament than anywhere else in the world. Today, thanks to the efforts of so many, women and girls have a much greater chance to live healthy and secure lives.

But, and you knew there would be a but, but the data also leads to a second conclusion. Despite all this progress, we're still not there yet. We're not there yet when we've nearly closed the global gender gap in primary school, but more than 30 million girls never go on to secondary school. We're not there yet, when every year more than one million girls are never born because of gender-biased sex selection, mainly in China and India. We're not there yet, when despite having increased the number of countries prohibiting domestic violence from just thirteen in 1995 up to 76 today. More than half the nations in the world still have no laws on the books, and an estimated one in three women is still subjected to violence. All the laws we've passed don't count for much if they're not enforced. Rights have to exist in practice, not just on paper. And laws have to be backed up with resources and political will with prosecutors and police officers and judges trained and committed to enforcement. They have to be made real in people's lives, as our new report documents deep-seated cultural codes and structural biases continue to hold back the full participation of women and girls and expose them to discrimination and abuse.

I hope you'll explore the data yourself at noceilings.org. It's designed for casual visitors to gain insights quickly or for committed activists and researchers to dive deep. We want these statistics and the stories they represent to open eyes, stir debate and spur action. So please visit, learn, share, tweet, organize, mobilize, join us in making

absolutely clear that the full participation of women and girls is the great unfinished business of the 21st century, and not just for women, for everyone.

We know that the only way to achieve broad-based growth and prosperity in a competitive and interdependent world is to build economies and societies that work for everyone and include everyone. We can't afford to leave any talent on the sidelines. Take the United States, if we closed the gap in workforce participation between men and women, our economy would grow by nearly 10%, and the numbers are significant for other economies as well. That's the power of full participation, particularly in the business sector, and particularly in the formal business sector, where as the Secretary-General pointed out, it can be measured. It can go into the gross domestic product, not just change lives and families, but lift up societies and propel economies.

We've proven that progress is possible, but we can't preach just to ourselves. We do have to reach out to men, to religious communities and as we're doing here to businesses, to every partner we can find and present that evidence. We need a strong goal on gender equality, and we need to integrate gender equality throughout all of the goals of the global sustainable development goals. It's important to do that, because if it's not there, if it's not measured, there will be less of a force behind change. So let us make sure that in the global sustainable development goals, we zero in on the continuing gaps affecting gender.

So from our perspective, now that we look back 20 years. I think we can be gratified that we have stuck together as a world that we have continued to make the case and found new ways of making it. You know, I have to say when I was Secretary of State and I would speak with my colleagues across the world about these issues. There was a moment when I often saw their eyes glaze over, and I could almost read their minds. Yes, I know she's gonna talk to me about women and I just have to put a smile on my face. And we'll get through this and go on to the important issues. That began to change as we saw more evidence, particularly about economic growth and the role the private sector can play in including more women and unleashing their talents and ambitions. From satellite television to Tumblr, technology is also helping to bring this to the attention of everyone. The momentum for change is here. But now we have to decide how we're going to respond.

So I applaud all of you who have not just passed laws, but changed minds, not just mobilize data to make a case, but resources to make a difference, who have reached

throughout your societies and throughout international organizations to ensure that the lives and stories of women are never lost. Bringing women and girls off the margins and into the mainstream of every profession as well as every community and every country has to be our mission now.

The progress of the past twenty years was not an accident. It took commitment, it took accountability, it took unity, it took a lot of hard work, and the United States has a responsibility and continues to lead on these issues and to make our own country a real beacon for what is possible, whether that's equal pay for equal work or encouraging more women to pursue careers in science, technology, engineering, or mathematics, or defending a woman's right to make her own reproductive health decisions. We have to be on the front lines with all of you.

These issues remain deeply personal for me. My late mother was born before women in the United States could vote. She came of age at a time when there were very few avenues for education or employment for women. But she had real grit and grace. And she gave me the conviction that no matter what the challenges the world throws at you, you had to work hard, have integrity, provide service to others, create a life that you would be proud of. And we know there are so many women whose names will never be in the headlines, like my mother. And we can all stop for a minute and just think about the women who we have known, the teachers, the parents, the mentors who have made a difference for us. Now, it is our turn to do that for the next generation.

Some of you who were there in Beijing will remember driving out to join the thousands of activists who have been sent to a separate site about an hour outside of the city. Women were standing for hours in the torrential rains, mud up to their knees, waiting to get into an old theatre. They were, of course, a little frustrated, but they were determined. And once they got inside, they sang, they clapped, they cheered, demanding equal rights and equal opportunity. That's what we have to keep in mind. All of those women and men who are on the front lines, who are doing the, sometimes, dangerous work of actually living equality, of holding up the possibility of freedom. I'm excited by where we are, and particularly that we have brought in so many businesses who understand the role that they can play.

And now, of course, that I am a grandmother, I want to make sure that all children have those same opportunities to live up to their own god-given potential. And that's up to us to make sure the world they inherit is worthy of them. So thank you for keeping

up the mission. Thank you for having the purpose that brings you here today. And let’s keep working until we can finally say the unfinished business of the 21st century is done. Thank you all.

Appendix IV: Chinese speech

尊敬的潘基文秘书长，

尊敬的姆兰博－努卡主任，

尊敬的各位同事，

女士们，先生们，朋友们：

在联合国成立七十周年、北京世界妇女大会召开二十周年之际，我们在这里举行全球妇女峰会，为促进男女平等和妇女发展重申承诺、共谋未来，意义重大。

妇女是物质文明和精神文明的创造者，是推动社会发展和进步的重要力量。没有妇女，就没有人类，就没有社会。

追求男女平等的事业是伟大的。纵观历史，没有妇女解放和进步，就没有人类解放和进步。为实现男女平等的崇高理想，人类走过了不平坦、不平凡的历程。从两百多年前世界第一份妇女权利宣言诞生，到“三八”国际劳动妇女节的设立，到联合国成立妇女地位委员会，到通过《消除对妇女一切形式歧视公约》，妇女事业发展的每一步都推动了人类文明进步。

二十年前，在北京，第四次世界妇女大会通过了《北京宣言》和《行动纲领》，达成促进男女平等、保障妇女权利的战略目标和政策框架。今天，北京世界妇女大会所宣示的精神，在世界催生了积极变化。各国追求男女平等共识日益强化，推动妇女发展行动更趋多样化，妇女生存发展环境不断优化。联合国妇女署做了大量工作，值得充分肯定。

经过持续不断努力，许多以前遥不可及的梦想已经成为现实：全球一百四十三个国家通过立法明确规定男女平等，妇女参与政治经济活动在法律上已经没有障碍，妇女接受教育、婚姻自由、职业自由等已经成为社会共识。

同时，环顾世界，各国各地区妇女发展水平仍然不平衡，男女权利、机会、资源分配仍然不平等，社会对妇女潜能、才干、贡献的认识仍然不充分。现在全球八亿贫困人口中，一半以上是妇女。每当战乱和疫病来袭，妇女往往首当其冲。面对恐怖和暴力肆虐，妇女也深受其害。时至今日，针对妇女的各种形式歧视依然存在，虐待甚至摧残妇女的事情时有发生。

事实表明，实现男女平等，还需要我们付出巨大努力。我们要不懈努力，为妇女事业发展开辟广阔道路。

女士们、先生们、朋友们！

我们刚刚通过二零一五年后发展议程，性别视角已纳入新发展议程各个领域。让我们发扬北京世界妇女大会精神，重申承诺，为促进男女平等和妇女全面发展加速行动。

第一，推动妇女和经济社会同步发展。发展离不开妇女，发展要惠及包括妇女在内的全体人民。我们要制定更加科学合理的发展战略，既要考虑各国国情、性别差异、妇女特殊需求，确保妇女平等分享发展成果，又要创新政策手段，激发妇女潜力，推动广大妇女参与经济社会发展。中国实践证明，推动妇女参加社会和经济活动，能有效提高妇女地位，也能极大提升社会生产力和经济活力。

第二，积极保障妇女权益。妇女权益是基本人权。我们要把保障妇女权益系统纳入法律法规，上升为国家意志，内化为社会行为规范。要增强妇女参与政治经济活动能力，提高妇女参与决策管理水平，使妇女成为政界、商界、学界的领军人物。我们要保障妇女基本医疗卫生服务，特别是要关注农村妇女、残疾妇女、流动妇女、中老年妇女、少数族裔妇女的健康需求。我们要采取措施确保所有女童上得起学和安全上学，发展面向妇女的职业教育和终身教育，帮助她们适应社会和就业市场变化。

第三，努力构建和谐包容的社会文化。男女共有一个世界，消除对妇女的歧视和偏见，将使社会更加包容和更有活力。我们要努力消除一切形式针对妇女的暴力，包括家庭暴力。我们要以男女平等为核心，打破有碍妇女发展的落后观念和陈规旧俗。[我们]我赞赏潘基文秘书长发起的“他为她”的倡议，希望越来越多男性参与进来。

第四，创造有利于妇女发展的国际环境。妇女和儿童是一切不和平不安宁因素的最大受害者。我们要坚定和平发展和合作共赢理念，倍加珍惜和平，积极维护和平，让每个妇女和儿童都沐浴在幸福安宁的阳光里。

各国妇女团体应该加强交流，增进友谊，共同发展，共同进步。要继续开展妇女领域国际发展合作，发达国家要加大对发展中国家的资金和技术援助，缩小各国妇女发展差距。

女士们、先生们、朋友们！

在中国人民追求美好生活的过程中，每一位妇女都有人生出彩和梦想成真的机会。中国将更加积极贯彻男女平等基本国策，发挥妇女“半边天”作用，支持妇女建功立业、实现人生理想和梦想。中国妇女也将通过自身发展不断促进世界妇女运动发展，为全球男女平等事业作出更大贡献。

为支持全球妇女事业和联合国妇女署工作，中国将向妇女署捐款一千万万美元，用于支持落实《北京宣言》和《行动纲领》，落实二零一五年后发展议程相关目标。在今后五年内，中国将帮助发展中国家实施一百个“妇幼健康工程”，派遣医疗专家小组开展巡医活动；实施一百个“快乐校园工程”，向贫困女童提供就学资助，提高女童入学率；邀请三万名发展中国家妇女来华参加培训，并在当地为发展中国家培训十万名女性职业技术人员。在中国同联合国合作设立的有关基金项下，将专门开展支持发展中国家妇女能力建设的项目。

女士们、先生们、朋友们！

让我们携手努力，加速行动，共建共享一个对所有妇女、对所有人更加美好的世界！

预祝峰会圆满成功！

谢谢大家。