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THE INFLUENCE OF DOMAIN KNOWLEDGE ON SIMULTANEOUS INTERPRETING TASKS PERFORMED BY STUDENTS:

An exploratory study of the interpreting process

Uberlândia/MG
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The greater our knowledge increases the more our ignorance unfolds.

John F. Kennedy

ABSTRACT

This senior thesis aims to analyze the role that domain knowledge—as both declarative knowledge and procedural knowledge—plays on the performance and understanding of simultaneous interpreting tasks performed by translation students. The participants of this study were students from two classes of the undergraduate program in Translation of the Federal University of Uberlândia. A questionnaire was applied to assess whether the students' beliefs about simultaneous interpreting changed after they had acquired theoretical and practical training to perform simultaneous interpreting tasks. Recordings of a simultaneous interpreting session were analyzed to assess whether domain knowledge had an impact on the cognitive effort of the students as measured through six cognitive effort markers, namely: (a) omissions, (b) additions, (c) head starts, (d) pauses, (e) meaning errors, (f) and logical-time sequence errors. The software *Sanako* 9.3 was used to record the interpreting sessions, and the software *ELAN* 5.2 was used to analyze these data from the recordings. The results point out that some of the beliefs changed (i.e., regarding the role of interpreter's training, the importance of domain knowledge to the interpreter's performances), while others did not (e.g., regarding the need for a special gift to perform an interpreting task). The results also indicate that the students' declarative knowledge and procedural knowledge changed after they had received theoretical and practical training in simultaneous interpreting. However, it was not sufficient to help them find interpreting strategies to avoid a high level of cognitive effort, which eventually ended up with several errors and problematic renditions in the target language. This research contributes to both translation process research and simultaneous interpreter training.

Keywords: Translation Process Research. Simultaneous Interpreting. Domain Knowledge. Interpreter Training. Students' Beliefs.

RESUMO

Esta monografia tem como objetivo analisar o papel que o conhecimento de domínio, em termos tanto de conhecimento declarativo quanto de conhecimento procedimental, exerce na compreensão e no desempenho de estudantes de tradução ao realizarem tarefas de interpretação simultânea. Os participantes desta pesquisa são estudantes de duas turmas do Curso de Graduação em Tradução da Universidade Federal de Uberlândia. Aplicou-se um questionário para avaliar se as crenças dos alunos sobre interpretação simultânea mudaram após formação teórica e prática em interpretação simultânea. Também foram realizadas gravações de sessões de interpretação simultânea para avaliar se o conhecimento de domínio exerceu alguma influência no esforço cognitivo dispendido pelos estudantes durante a sessão de interpretação simultânea. O esforço cognitivo foi medido considerando as variáveis: (a) omissão, (b) adição, (c) *décalage*, (d) pausa, (e) erros de significado e (f) erros de sequência lógico-temporal. O *software Sanako* 9.3 foi usado para gravar as sessões de interpretação, e o *software ELAN* 5.2 foi usado para analisar os dados das gravações. Os resultados apontam que algumas crenças mudaram (*i.e.*, aquelas relacionadas ao papel da formação de intérpretes e à importância do conhecimento de domínio para o desempenho de intérpretes), enquanto outras permaneceram (*e.g.*, a necessidade de se possuir um dom especial para a realização de uma tarefa de interpretação). Os resultados também indicam mudanças nos conhecimentos declarativo e procedimental dos alunos após o recebimento de formação teórica e prática sobre interpretação simultânea. Porém, o conhecimento adquirido não foi suficiente para ajudá-los a encontrar estratégias de interpretação que evitassem um alto nível de esforço cognitivo, o que acabou se revelando diversos erros e em um discurso com segmentos problemáticos na língua-alvo. Esta pesquisa contribui tanto para a área dos estudos processuais da tradução quanto para a formação de futuros intérpretes simultâneos.

Palavras-chave: Estudos Processuais da Tradução. Interpretação Simultânea. Conhecimento de Domínio. Formação de Intérpretes. Crenças de Estudantes.

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1 INTRODUCTION

The simultaneous interpreters' ability to listen to a speech in one language and, nearly at the same time, re-express it in another language is something that intrigues not only laymen, but also practitioners and researchers from different disciplines, including the Translation Studies, the Language Studies, Cognitive Psychology, and Neuroscience. Such researchers have been trying to account for this phenomenon by building on assumptions and methods from their own domain areas.

A research field interested in this phenomenon of listening to a speech in one language, mentally translating it and retelling it in another language at nearly the same time is Translation Process Research (TPR). One of the aspects analyzed in this field is the impact domain knowledge has on simultaneous interpreters' performance, especially when it comes to cognitive effort (TISELIUS; JENSET, 2011; TIMAROVÁ, 2010; TISELIUS, 2013).

Translation process research is a growing field within the Translation Studies (e.g., MEES; ALVES; GÖPFERICH, 2009; GÖPFERICH; ALVES; MEES, 2010; TIMAROVÁ, 2010; SHREVE; ANGELONE, 2010; ALVSTAD; HILD; TISELIUS, 2011; TISELIUS, 2013; ALVES, 2015). According to Alves (2003, p. 72), this field has shown significative advances in the last years, but it still has several gaps to address.

By drawing on TPR and carrying out applied, exploratory, empirical research (HALE; NAPIER, 2013), this senior thesis investigates the performance of four translation students who assumedly acquired domain knowledge in simultaneous interpreting[1] as compared to four students who do not have such knowledge. As such, this study is not focused on the interpreting product itself, but rather on the processes underlying an interpreter's delivery (ALVES, 2003).

Such study builds on the assumption that interpreters should have broad knowledge of the topic of the session they are about to interpret, that is, interpreters should have not only linguistic knowledge, but also, and most importantly, domain knowledge (LIU; SCHARLLERT; CARROLL, 2004). According to Hambrick and Engle (2002), "domain knowledge is the primary determinant of success in cognitive

[1] These students have had only one course on this topic during the whole undergraduate program. It is accounted for in the Data Analysis and in the Final Remarks sections (Sections 4 and 5).

endeavors", such as interpreting. Therefore, the findings of this study may provide professional interpreters with empirical data to support their requests for preparation time and consulting material from their clients.

Incidentally, this study can also contribute to interpreter training. Learning provides new knowledge, which in turn can change the interpreters' beliefs about their work and, consequently, can help them find better interpreting strategies, make better deliveries and expend less cognitive effort during a work session. According to Farrington-Darby and Wilson (2006, p. 28), "the more we understand how people perform (their limitations and capabilities) and what factors affect performance (either positively or negatively), the more we can shape performance through good design of systems, jobs, training etc *[sic]*."

The general objective of this senior thesis is to analyze the role that domain knowledge—including both declarative knowledge (assessed through questionnaires) and procedural knowledge (assessed through recordings of a simultaneous interpreting session)—plays on the performance and understanding of simultaneous interpreting tasks. Two specific objectives were established, namely:

1. To assess whether students' beliefs about simultaneous interpreting change after they acquire theoretical and practical training to perform simultaneous interpreting tasks; and
2. To assess whether domain knowledge has an impact on the cognitive effort of translation students during a simultaneous interpreting session, by analyzing their (a) omissions, (b) additions, (c) head starts, (d) pauses, and (e) meaning errors and (f) logical-time sequence errors.

Such objectives ended up with the following research questions:

1. Are the beliefs about simultaneous interpreting different between students who acquired domain knowledge of simultaneous interpreting and students who did not?
2. Is the cognitive effort of translation students who acquired domain knowledge of simultaneous interpreting different from that of students without such knowledge while performing a simultaneous interpreting session?

The initial hypotheses are that

1) There are differences between the beliefs about simultaneous interpreting held by students before and after receiving theoretical and practical training in simultaneous interpreting; and
2) Domain knowledge acquired through formal training has a positive impact in decreasing the cognitive effort of translation students during a simultaneous interpreting session.

This thesis is divided into five chapters, including this Introduction. Chapter 2 presents a review of the literature relevant to the topics under scrutiny. Chapter 3 describes the methodology used to collect and analyze the data. Chapter 4 provides an analysis of the data collected through questionnaires and recordings, as well as briefly discusses the findings based on the literature. Chapter 5 provides some final remarks, including the limitations of this study and suggestions for further research.

2 REVIEW OF THE LITERATURE

2.1 Translation and Interpreting

Translation and Interpreting are different areas within Translation Studies. Translation refers to written texts, while interpreting refers to oral texts (LEDERER, 2003). However, they share the same purpose:

> The main purpose of both translation and interpreting is to transfer [*sic*] a message expressed in a certain language to another language, so it can be understood by a community that does not speak the language in which this message was originally produced. (PAGURA, 2003, p. 223)[2]

Both translators and interpreters are supposed to fully master both languages involved in the process and the topic of the text to be translated or interpreted (PAGURA, 2003). In addition, both activities are supposed to be performed by "professionals capable of understanding and articulating ideas related to several different areas of human knowledge"[3] (PAGURA, 2003, p. 224). Therefore, translators and interpreters are supposed to be constantly updated about the domain areas with which they work and be in touch with experts in these areas.

Despite such similarities, interpreting and translation are indeed different from each other in several aspects. During the translation task, translators have time to search dictionaries, glossaries and other external support, while interpreters have time only to search their memories (VIANNA, 2006). To compensate the lack of time to search in external resources during the interpreting task, interpreters are supposed to master both source and target languages and cultures, as well as the topic of the speech, even more than translators do (PAGURA, 2003). This is why interpreters should study the topic of the speech to prepare themselves before an interpreting session.

Unlike translators, interpreters have no time to review the target speech. Interpreters need to analyze the content of the source message and re-express it in the target language, with all its sentences connected and within the conventions of the target culture, a few minutes (or seconds) apart from the utterance of the source

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2 My translation to: "O propósito principal tanto da tradução quanto da interpretação é fazer com que uma mensagem expressa em determinado idioma seja transposta [*sic*] para outro, a fim de ser compreendida por uma comunidade que não fale o idioma em que essa mensagem foi originalmente concebida" (PAGURA, 2003, p. 223).

3 My translation to: "ser realizadas por profissionais capazes de compreender e expressar idéias [*sic*] relacionadas às mais diferentes áreas de conhecimento humano" (PAGURA, 2003, p. 224).

speech (PAGURA, 2003). Therefore, interpreters should have the ability to concentrate and tie together all the pieces of the source speech.

Another difference, according to Vianna (2006), is that translators have access to the entire source text at once, which does not happen in interpreting. Interpreters only have access to new text material while the speaker is uttering his/her speech. As a result, especially in simultaneous interpreting, it is the speaker, rather than the interpreter, who sets the target speech production rhythm. Besides, while performing his/her delivery, an interpreter can only have access to what s/he has retained in the memory while listening to the speaker. This explains why interpreters do not say every word the speaker says and end up omitting much more and more frequently than translators do.

An advantage interpreters have in relation to translators is their immediate access both to the author of the source speech and to the target audience. Translators, most of the time, do not know to whom they are translating to, and therefore they are not as capable of inferring the relevance of their translation as interpreters are.

2.2 Interpreting Modes and Types

There are different interpreting modes and types. According to Pagura (2003), the interpreting modes are: consecutive, simultaneous, and liaison interpreting.

In the *consecutive* mode, interpreters listen to and takes notes of a relatively long speech before taking the turn to re-express the speech in the target language. It generally happens in events that convene a small group of people and involve only two languages. This is the mode interpreter trainers use to develop “the techniques that are going to be fundamental to the performance of simultaneous [interpreting], such as the ability to understand and analyze the source speech” (PAGURA, 2003, p. 211)[4]

In the *liaison* mode, interpreters sit next to the listener and interpret short sentences, to both native and foreign languages, alternating their delivery with the

[4] My translation to: “as técnicas que serão fundamentais para o desempenho da [interpretação] simultânea, tais como a capacidade de compreensão e análise do discurso de partida” (PAGURA, 2003, p. 211).

speaker's speech. It is usually performed during small meetings and by untrained people (PAGURA, 2003).

In the *simultaneous* mode,

> Interpreters—always in pairs—work isolated within a glass booth, so that they can see the speaker and listen to his/her speech through headphones. They process the message and re-express it in the target language through a microphone connected to a sound system that takes their speech to the listeners, who listen to it through headphones or receptors similar to portable radios. This mode allows for translating [*sic*] the message to an infinite number of languages at the same time, as long as the equipment is capable of doing so. (PAGURA, 2003, p. 211)[5]

In performing simultaneous interpreting, while interpreters are making their delivery in the target language, they need to pay attention to the next unit of sense[6] that will be uttered by the speaker or they will incur the risk of not being able to express it right after. This is a triple process, as described by Lederer (2003), in which the three steps (i.e., listening to a unit of sense, deverbalizing[7] its linguistic form, and re-expressing it in the target language) happen simultaneously. Liu, Scharllert and Carroll (2004, p. 37) state "it is the act of temporarily switching attention from an unfinished utterance to an incoming message that makes the task of simultaneous interpreting so different from what we are used to in our usual mode of verbal communication".

Simultaneous interpreting has become an object of research exactly because it is an unusual act. Ericsson (2000) reports several studies on expertise in simultaneous interpreting (*e.g.*, CHERNOV, 1979; DILLINGER, 1989, 1994; GERVER, 1974; GERVER et al., 1984). He points out that most of them aim to analyze only the characteristics of the target speech produced, that is, the interpreting product, usually by comparing the professional interpreters' performance to that of bilinguals and/or novice interpreters.

Interpreting can also be classified according to where it is performed and to its objective (PAGURA, 2003). This results in the so-called interpreting types, such as

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5 My translation to: "os intérpretes – sempre em duplas – trabalham isolados numa cabine com vidro, de forma a permitir a visão do orador e recebem o discurso por meio de fones de ouvido. Ao processar a mensagem, re-expressam-na na língua de chegada por meio de um microfone ligado a um sistema de som que leva sua fala até os ouvintes, por meio de fones de ouvido ou receptores semelhantes a rádios portáteis. Essa modalidade permite a tradução [*sic*] de uma mensagem em um número infinito de idiomas ao mesmo tempo, desde que o equipamento assim o permita" (PAGURA, 2003, p. 211).

6 Defined as "what results from this fusion of the semanticisms of words and cognitive inputs" (LEDERER, 2003, p. 18).

7 Defined as "immediate and deliberate abandonment of words and retention of the mental representation of the message (concepts, ideas etc.)" by Seleskovitch (1978 apud PAGURA, 2003, p. 219).

community interpreting, court interpreting, conference interpreting, medical interpreting, and escort interpreting. Interpreting types may be performed in any mode (*e.g.*, liaison community interpreting). In the present study, the aim is to investigate simultaneous interpreting performed in the academic context.

2.3 Translation Process Research and Domain Knowledge

This study aims to analyze not only the simultaneous interpreting product, but also the cognitive process involved in the interpreting act. In other words, the aim is to look into both the target speech and what happens during its production by simultaneous interpreters.

The examination of both process and product may provide a richer picture of the task performed by the subject (KOBUS; PROCTOR; HOLSTE, 2001). Tiselius and Jenset (2011, p. 270) say

> … it is necessary to consider both process and product: process, because these may alter with experience without necessarily showing in the product; and product, because the products of experienced practitioners most likely differ from those of less experienced practitioners.

This point of view is shared by Alves (2003), who states that process and product data complement each other and can strengthen the analysis of cognitive processes that underlie the translation task. According to Farrington-Darby and Wilson (2006), to study different phenomena through the process perspective allows us to scrutinize the decision making and the problem solving involved in the production of the outcome. Alves (2003) includes other cognitive factors that may be studied through a process analysis, such as memory, attention, and categorizations.

Domain knowledge is one of the factors that can be studied through process analysis. *Domain* is “the subject area within which the task is being performed” (BUCHANAN; DAVIS; FEIGENBAUM, 2006, p. 88). It may “refer to both informal domains, such as sewing and cooking, and formal domains, such as biology and chess” (CHI, 2006, p. 21). *Domain knowledge* is the knowledge about a specific content, field of interest or practice that someone has (SCARDAMALIA; BEREITER, 1991).

Domain knowledge includes *declarative knowledge* and *procedural knowledge*, among others. According to Gonçalves (2006, p. 81),

> declarative knowledge indicates knowledge that we could identify as propositional, that is, it means knowing something, or implementing representations of events or of states of things. Due to its propositional

> nature, it entails conscious access and processing at the "highest" levels of the cognitive system. In contrast, procedural/operative knowledge indicates a "know-how" that is not necessarily of a propositional nature, but rather much more of an algorithmic nature.[8]

Declarative knowledge is knowing *that*, while procedural knowledge is knowing *how*: "to know what '+' means is declarative knowledge; being able to add is procedural knowledge" (BERGE; VAN HEZEWIJK, 1999, p. 615).

Domain knowledge and exposure to a specific domain provide familiarity with and meaningfulness to a task (FARRINGTON-DARBY; WILSON, 2006). In translation, "domain knowledge raises the number of words that can be processed by the working memory during the translation task"[9] and has a positive impact on the accomplishment of a translation task (DA SILVA, 2007, p. 90).

Translators tend to understand the source text better when it features contents within a domain that is relevant to them (HAMBRICK; ENGLE, 2002). A highly specialized domain knowledge of the source text is very important to superior performance in several domains of expertise (ERICSSON, 2000).

Domain knowledge is the most important difference between expert and novice interpreters (LIU; SCHALLERT; CARROLL, 2004). In fact, experts can produce a better target speech than novices when they are working within their domain of expertise. For instance, Soares (2015) observed that, in her sample, the interpreter who had the largest domain knowledge of the source speech was the one more capable of making adequate decisions and solving problems during an interpreting task.

Domain knowledge allows interpreters to judge what is going to be relevant to their target audience and to undo misunderstandings caused by cultural differences (VIANNA, 2006). Therefore, the target audience who is listening to the speech through interpreters may sometimes understand the speech better than the audience that is listening directly to the speaker.

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8 My translation to: "o conhecimento declarativo indica um saber que poderíamos identificar como proposicional, isto é, significa saber alguma coisa, ou implementar representações de eventos ou estados de coisas. Pelo seu caráter proposicional, implica acesso consciente e processamento nos níveis mais 'altos' do sistema cognitivo. Por outro lado, o conhecimento procedimental/operativo indica um 'saber fazer,' que não tem necessariamente uma natureza proposicional, mas, muito mais, algorítmica" (GONÇALVES, 2006, p. 81).

9 My translation to: "As evidências parecem apontar para o fato de que o conhecimento de domínio aumenta o número de palavras que podem ser operacionalizadas pela memória de trabalho durante a tarefa tradutória" (DA SILVA, 2007, p. 90).

2.4 Students' Beliefs

One of the goals of using a questionnaire in this thesis was to investigate the participants' beliefs about simultaneous interpreting. Pagano (2000, p. 9) defines *beliefs* as everything a student presumes about learning and about acquiring knowledge. Beliefs about translation and the translator comprise what the students believe that the act of translating is, or what a good translation is, or what role a translator plays, among others (PAGANO, 2000, p. 11).

Students' beliefs about the act of simultaneously interpreting a speech can affect their productions:

> Thus, solutions for the translations begin to be motivated by the translator-subject, by her/his assumptions about the text to be translated and even by the image s/he has about the clients' or readers' expectations. Such conception, in some way, gives self-confidence to the translation student and will be essential to her/his journey towards her/his training as a professional who will be aware of her/his role and not afraid of assuming, responsibly, her/his function as a re-creator of the translated text.[10] (STUPIELLO, 2006, p. 138)

Negative or inadequate beliefs may lead to inadequate and insufficient performances (PAGANO, 2000). In the translation domain, beliefs play a wider social role because they can influence not only the translator's performance, but also the way the society evaluates translation as a profession and the translator as a professional (PAGANO, 2000). By the same token, adequate beliefs take translators to success through the selection of the appropriate resources. They "filter the ways of thinking of and approaching the translation and have a considerable effect both on the translation student's performance and on the work to be done" (PAGANO, 2000, p. 11).[11]

Esqueda and Oliveira (2013) review the work of Rodrigues (2004), who corroborates Pagano (2000) and states that one of the major beliefs about translation is that a person should have a "gift" if s/he is to be(come) a good translator, that is, there is no need for specific training. Ericsson (2000) contends such a statement is

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10 My translation to: "As soluções para as traduções passam, então, a serem motivadas pelo sujeito-tradutor, por suas pressuposições a respeito do texto que traduz e, até mesmo, pela imagem que tem das expectativas de seus clientes ou de seus leitores, uma concepção que, de certa maneira, confere autoconfiança ao aprendiz de tradução, o que lhe será essencial em seu percurso em direção à capacitação de um profissional consciente de seu papel e sem receio de assumir, com responsabilidade, sua função de recriador do texto traduzido" (STUPIELLO, 2006, p. 138).

11 My translation to: "[As crenças] filtram as formas de pensar e abordar a tradução e têm um efeito considerável no desempenho do tradutor-aprendiz e no trabalho a ser desenvolvido" (PAGANO, 2000, p. 11).

common sense and also provides a study which refuses this idea (MOSER-MERCER et al., 2000). According to Pagano (2000), beliefs can be changed through some agent: experience or deliberate intervention of someone in the learning process.

2.5 Problem Triggers and Markers of Cognitive Effort

Seleskovitch (1978 apud PAGURA, 2003, p. 221) says the target speech in an interpreting session should always feature the "complete original message, with all its details, and reflect the characteristics of the target language."[12] Pio (2003, p. 69) argues that a good interpreting performance presents grammatically accurate target language and adequately reproduces "in the target language the contextually determined pragmatic sense." According to Pagura (2003), interpreters should be able to analyze the content of a message and use the cohesion elements to connect the speaker' sequence of thought.

Some markers of cognitive effort are identifiable when interpreters fail to achieve the aforementioned elements. They are referred to as *problem triggers* by Gile (1999) and may arise for several reasons, including: insufficient linguistic and/or extra linguistic knowledge of one or both languages in use (e.g., the relevant segments might be too specialized or even too difficult to render in the target language), cognitive saturation, trouble in dealing with the task processing itself (processing capacity deficit), or poor conditions in the delivery of the source speech (the relevant segments might have been poorly pronounced or delivered too quickly).

In Gile (1999, p. 157),

> … the existence of 'problem triggers' was hypothesized, in particular speech segments or tasks requiring heightened attentional resources. The assumption was that if indeed interpreters work near saturation level, even limited additional attentional requirements could lead to failure. Another hypothesis was that speech segments with low redundancy were also problem triggers, since they had low tolerance of attentional lapses such as might occur because of attentional mismanagement.

Such problem triggers may generate failures next to the relevant segment itself and at a distance, thereby causing a failure sequence (GILE, 1999). This may happen due to a local attentional management deficit: the interpreter is paying attention to a difficult segment and forgets to pay attention to the next one, which may be just as difficult, and, eventually, it will lead to a failure. Difficulties in

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[12] My translation to: "a mensagem original deve ser completa, provida de todos os detalhes e deve refletir as características a língua de chegada" (SELESKOVITCH, 1978 apud PAGURA, 2003, p. 221).

processing capacity management and/or cognitive saturation may cause deterioration in the interpreters' output (GILE, 2011).

According to Ericsson (2000), the reader begins to engage in problem-solving activities when the text is difficult to understand, either because of unfamiliar vocabulary or lack of necessary background knowledge. Some of such problem-solving activities are called *strategies*. From Pagano's (2000) standpoint, strategies are all forms of problem-solving actions in which an individual engages, either consciously or unconsciously. The strategies used by translation students may also be closely related to their beliefs about translation (PAGANO, 2000).

Li (2013, p. 105), however, argues that strategies "are intentional and goal-oriented procedures to solve problems resulting from the interpreters' processing capacity limitations or knowledge gap, or to facilitate the interpreter's task and prevent potential problems". The author says there are several strategies which may reduce the interpreters' cognitive load and help interpreters solve or avoid cognitive or language problems. Such strategies tend to become automatic solutions as the interpreter uses them more frequently. Such automaticity reduces the cognitive load and, consequently, the cognitive effort, while also helping the translators and interpreters deliver more adequate, reliable and satisfactory products (LI, 2013).

Identifying the strategies used by the interpreters can

> … contribute to the description of the interpreting process. […] An understanding of interpreters' use of certain strategies to solve problems reveals about the relations between the original discourse, the interpreted discourse, the possible problems in interpreting, the strategies applied, the interpreter, and the communicative setting. (LI, 2013, p. 108)

Since the focus of this work is on identifying the influence of domain knowledge on the translation students' process and product, it targets markers of cognitive effort related to meaning (PIO, 2003) (*i.e.*, omissions and additions), markers of cognitive effort related to fluency (*i.e.*, head starts and pauses) (PIO, 2003), and errors committed by the students, that is, meaning errors (GILE, 2011) and logical-time sequence errors (PIO, 2003). The two last categories of markers were also investigated because they affect, to some extent, the meaning of the translation students' delivery.

2.5.1 Omission

The simultaneous interpreting task forces interpreters to extract the speech's main ideas. Due to the speed in which the task is performed, it is difficult to say every word the speaker is saying.

To omit is to render the original message in a more general and concise way (LI, 2013), and knowing what to omit is an important ability for interpreters (SHLESINGER, 2000), who usually do this deliberately aiming at reducing effort and ensuring greater target-speech clarity (PIO, 2003). Therefore, omissions are often (but not necessarily) a strategy to avoid cognitive overload and producing ungrammatical or unfinished sentences (GILE, 2011).

Interpreters usually omit repetitive, redundant and less important information from the source speech. Long omissions are usually considered a strategy (GILE, 2011). Interpreters decide to omit long clauses, full sentences and even longer utterances to avoid lagging behind the speaker, missing important information, or losing control of the task.

There is an interpreting problem, however, when interpreters do not select the correct information to omit and, as a result, the listener does not understand the message. Li (2013, p. 110) contends that interpreters may use "periods of silence and pauses in which certain messages are not interpreted at all due to comprehension, note reading, or memory failure." Pio (2013, p. 70) highlights Gever's (1971) proposition that sometimes "omissions of words, omissions of phrases, omissions of longer stretches of input of eight words or more" that causes discontinuities in the output compared to the input are errors, rather than strategies. Omissions of basic source-speech information units (words with high information relevance, phrases, clauses, or even whole sentences which are either highly informative or rhetoric) cause changes to the source speech meaning and are detrimental to the speaker's communicative intent (PIO, 2003).

2.5.2 Addition

Additions are new materials added or expansion of the source speech that the interpreters perform to express a clearer message or to avoid the delivery of unclear information in the target speech (LI, 2013). They are a survival strategy that interpreters search to avoid leaving the listener in complete silence. However, this

may change the meaning of the source speech, and sometimes lead to discontinuity errors (PIO, 2003).

Pio (2003, p. 83) reinforces Barik's (1994) argument that interpreters add neutral information as "a remedy for previous omission." When they do so, additions can co-occur with different errors, which may create "contradictions, ambiguous statements or misinterpretations, and logical-sequence errors" (PIO, 2003, p. 93).

2.5.3 Head Start

Head start, also called *ear-voice span (EVS)*, *décalage*, or *time lag*, is the "time spent to process the information received and then reorganize its form of uttering"[13] (PAGURA, 2003, p. 211). Interpreters decide how much time they will lag behind the speaker based on their memory capacity limitations (GILE, 1999).

Timarová, Dragsted and Hansen (2011), while reviewing the works of Pöchhacker (2004), Treisman (1965) and Shlesinger (1998), argue that this is a variable that reflects temporal characteristics of processing. It "provides insight into the temporal characteristics of simultaneity in interpreting, speed of translation and also into the cognitive load and cognitive processing involved in the translation/interpreting process" (TIMAROVÁ; DRAGSTED; HANSEN, 2011, p. 121).

Head start is influenced by both external factors (e.g., the speaker's delivery rate, text type, language difficulty, and accent) and internal factors (e.g., subjective perception of speech difficulty, strategies, familiarity with the topic, and segmentation of the input) (TIMAROVÁ; DRAGSTED; HANSEN, 2011). Pio (2003), while reviewing Gerver (1971), argues that interpreters tend to increase their distance from the speaker's utterance when they need to interpret a source speech delivered at increased rate.

There is no consensus about the exact amount of head start interpreters should spend. Anderson (1994) says it is three seconds on average, while Lee (2002) states it is somewhere between two and five seconds, with four seconds being the limit for target speech's accuracy.

Despite the differences, there is a consensus that a "longer time lag in interpreting reflects more elaborate processing" (TIMAROVÁ; DRAGSTED; HANSEN, 2011, p. 139). Therefore, interpreters that spend more than four seconds,

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[13] My translation to: "espaço de tempo para processar a informação recebida e reorganizar sua forma de expressão" (PAGURA, 2003, p. 211).

according to Lee (2002), could have found a problem that they do not know how to solve. This may lead to incorrect interpreting which cannot be considered a strategic action deliberately taken by the interpreter.

2.5.4 Pause

Pauses indicate that a cognitive process is taking place, and that the translator is searching for planning strategies to solve a problem (SCHILPEROORD, 1996). This can also be applied to interpreting problems. There are four main possible causes for a pause: cognitive, physical (breathing or articulatory pauses, which normally last less than .25 seconds), social-psychological (stress or speaking anxiety), and communicative causes (time for the speaker to prepare the subsequent speech and for the interlocutors to understand the message) (SCHILPEROORD, 1996).

This study focuses on the cognitive pauses, which indicate changes in the attentional state and require more cognitive effort when they are long (ALVES, 2003; SCHILPEROORD, 1996). Pio (2003) defines an unfilled pause "as a silence between two speech sequences lasting more than three seconds" (PIO, 2003, p. 75) When the pause exceeds this time, it may be a sign that the interpreter is at odds with the task.

2.5.5 Meaning error

Meaning errors are incorrect interpreting of words. This happens more frequently with false cognates. They occur when the interpreter does not understand a word, or a group of words uttered by the speaker (GILE, 2011). They

> … can result from insufficient background knowledge or linguistic knowledge, or from signal distortions (the speaker's strong unfamiliar accent, background noise), from cognitive saturation affecting the Listening Effort, or, more interestingly, from a processing capacity deficit in the Production Effort. In non-technical everyday language (as opposed to rare words or specialized terms), false cognates in a skilled interpreter's output into an A language (native language) are likely to result from such cognitive failures. (GILE, 2011, p. 206)

2.5.6 Logical-time sequence error

According to Pio (2003, p. 75), logical-time sequence errors are found in reference to

> the interpreter's ability to properly reproduce in the TT [target text] the logical relation among clauses, phrases or sentences of the ST [source text]. Moreover, this criterion also concerns the interpreter's ability to respect the time sequence of information material presented in the ST [source text].

Logical-time sequence errors are discontinuities that change the logical relation between source-speech information units in the target speech (logical sequence) or time references (time sequence) in the target speech. They represent a change in the speaker's communicative intentions and, consequently, in the source-speech meaning (PIO, 2003). These are the type of discontinuity errors that "reflect insufficient knowledge of the relevant languages and/or insufficient extralinguistic knowledge, but also saturation[14] due to high processing capacity requirements as well as processing capacity management errors" (GILE, 2011, p. 205). High delivery rate of the source speech is another possible cause of this type of error (PIO, 2013).

Logical sequence errors create new relations among clauses or sentences in the target speech which did not exist in the source speech (PIO, 2003). Fragmented utterances, unfinished sentences and omission of large units of the source discourse represent this kind of error (PIO, 2013).

Errors in verb tense and mode, as well as changes to time references, days and years, represent time sequence errors (PIO, 2003). Less time for interpreters to segment information units and connect them according to the time sequence in the source speech may lead to such errors (PIO, 2003).

[14] Cognitive saturation occurs when the interpreter consumes almost all his/her total available capacity. It can be caused by cognitive overload or local attentional deficit and, consequently, deterioration of the interpreter's output (GILE, 1999).

3 METHODOLOGY

3.1 Data Collection

This is an applied, exploratory, empirical research (HALE; NAPIER, 2013)[15]. Domain knowledge of Translation Studies, especially about interpreting, was defined as the independent variable, and cognitive effort, which may be related to the participants' beliefs about interpreting, is the dependent variable.

Each year, 20 new students enter the 3.5 year-long undergraduate program in Translation at the Federal University of Uberlândia. The participants of this study were students from two classes of this program. The Experimental Group (EG) comprised 13 students who were attending the 60-hour-long (fulfilled in 4 months) course "Interpreting Foundations" (*Fundamentos da Interpretação*), in their sixth semester, and the Control Group (CG) comprised 10 students, in their fourth semester, who had not taken this course yet. The data were collected during the second semester of 2017. All students were chosen by convenience and provided informed consent as approved by the university's ethics committee (Approval No. 1,314,979).

Students were asked to answer a questionnaire and to perform a simultaneous interpreting session. The participants from the EG were also asked to answer the same questionnaire once again at the end of the semester, approximately 1.5 month after the first application. The interpreting task was designed to assess whether the cognitive effort made by translation students who had acquired domain knowledge of interpreting is different from that made by students who did not. The questionnaire was designed to assess the participants' declarative knowledge and differences in beliefs between students who had domain knowledge of interpreting and students who had no such knowledge.

The questionnaire was based on Esqueda and Oliveira (2013) and Soares (2015). However, some questions were adapted (questions about translation were

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[15] An "applied research aims to investigate real-world problems with the aim to solve them" (HALE; NAPIER, 2013, p. 20); an exploratory research "create a general mental picture of conditions" (HALE; NAPIER, 2013, p. 20); and an empirical research "refers to our own collection and analysis of data" (HALE; NAPIER, 2013, p. 19).

changed into questions about interpreting), and some questions related to the focus of this research were added (the ones about domain knowledge).

The questionnaire encompassed 14 open-ended questions to collect the participant's: age, gender, mother tongue, number of foreign languages spoken, level of proficiency in each foreign language (considering CNPq's scale for Lattes curriculum), years of study of the English language, institution of English studies, experience abroad, experience in interpreting, difficulties in interpreting, training in interpreting, and attendance to interpreting conferences. It also included two open-ended questions to identify the participants' opinions and beliefs about simultaneous interpreting: 1) one about the influence students thought that experience, or the lack thereof, have on their performance as simultaneous interpreters-to-be; and 2) one about the influence they thought interpreting events and/or courses have on their training process as simultaneous interpreters. In addition, it encompassed one closed-ended question about their level of agreement (completely disagree, partially disagree, neither agree nor disagree, partially agree, completely agree) with 13 statements—nine on the students' beliefs about the characteristics of a good simultaneous interpreter, and six on the students' domain knowledge of simultaneous interpreting. Two of these statements referred to both beliefs and domain knowledge. Finally, an open-ended question asked for further comments, if any (cf. Appendices 1 and 2).

The questionnaire was piloted with five students from the second semester of the same undergraduate program in Translation to ensure that the questionnaire was a valid instrument (HALE; NAPIER, 2013). They were asked to answer the questionnaire and to give an account of the difficulties they had in answering it. They pointed out three questions that needed to be reformulated to become clearer to the reader (questions 5, 6 and question 17—sentences *b* and *g*).

Students from the EG were in the sixth semester and had already received a little theoretical and practical training in consecutive interpreting during previous classes of "Interpreting Foundations" by the time they answered the questionnaire for the first time (Questionnaire 1—Q1), but they had not received any training in simultaneous interpreting yet. Students from the CG were in the fourth semester and had not received any specific, formal training in interpreting, but had already had a reasonable level of formal training in translation.

Each group answered the questionnaire during class time, in their classrooms, at a moment provided by their teachers. Students from the EG answered the same questionnaire again (Questionnaire 2—Q2) one month and a half after answering it for the first time, after attended classes about simultaneous interpreting. The questionnaire was answered again to check if there were changes in the students' beliefs throughout time, i.e., after they acquired a little theoretical and practical training in simultaneous interpreting.

According to Ericsson (2000, p. 205) "verbal descriptions and explanations given by experts and other subjects are often inconsistent with careful observations of their actual behavior." In general, there are several inconsistencies between actual behavior and answers from questionnaires. This is the reason why the participants were asked to also perform a simultaneous interpreting session.

Four students in the EG and four students in the CG were recruited to perform a simultaneous interpreting session of a five-minute video three weeks after they had answered the questionnaire (Questionnaire 1, in the EG's case). The interpreting sessions were conducted individually at the Laboratory of Languages (Labling) in the Institute of Language and Linguistics, Federal University of Uberlândia. Each student was on a separate booth, with adequate equipment (an individual screen showing the video to be interpreted, headphones, microphone and suite to regulate the microphones' and the headphones' volume).

The interpreted video (in .mp4 format) featured a speaker talking about interpreting as a career, similarities and differences between interpreting and translation, and similarities and differences between consecutive and simultaneous interpreting. The interpreting sessions were recorded using the software *Sanako* 9.3 and were saved as audio files (.mp3 format). The recorded audio files contained both source and target speeches, but the target speech's volume was higher than the source speech's volume. The lecturer responsible for the course "Interpreting Foundations" operated the software *Sanako* 9.3 during the sessions of both groups.

Students from the EG had their performances recorded during a regular "Interpreting Foundations" class, as part of the practical activities proposed by the course's teacher. The simultaneous interpreting performances were recorded during the first video exhibition. Students from the CG had their sessions scheduled in a timeslot different from their class time, but also with the assistance of the lecturer responsible for the course "Interpreting Foundations." They received guidance about

the equipment, since they were unfamiliar with it, and about the task to be performed. The video was shown twice. The first exhibition was used for the students to familiarize with the process of performing the task and with the equipment. The second exhibition was used for the students to perform the interpreting task. The students' productions were recorded during the second exhibition of the video only.

3.2 Data Analysis

The data collected through the questionnaires were processed using the *Google Forms* and *Microsoft Excel*. All the data from the questionnaires presented a percentage in relation to the total number of participants: 13 students answered Questionnaire 1 (Q1) in the EG, 11 students answered Questionnaire 2 (Q2) in the EG[16], and 10 students answered the Questionnaire in the CG.

The comparisons between the answers to the EG's Q1 and Q2, and between the answers to EG's Q2 and CG's Questionnaire were based on the graphs that represented each questionnaire's percentages. These comparisons aimed: 1) to identify potential differences in the perception of the EG' students about the influence of domain knowledge on simultaneous interpreting before and after receiving theoretical and practical training, and 2) to assess whether there were differences in the perception students from each group had about the influence of domain knowledge on simultaneous interpreting.

Students were given codes to maintain confidentiality. All students from the EG received the code SWT (student with training) plus a sequential number (1 to 13) and a number that indicates if the answer corresponds to Q1 or Q2. For instance, SWT101 indicates that this is the 10th student who answered Q1 in the EG. All students from the CG received the code SOT (student without training) plus a sequential number (1 to 10). For instance, SOT8 indicates that this is the 8th student who answered the questionnaire in the CG.

Google Forms was used to generate the percentages for questions 1 to 14, that is, the questions which describe the groups' profiles. After creating an online form and transcribing each participant's answer to the entire questionnaire, the online software automatically generated the percentage graphs.

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[16] Two of the students who answered Questionnaire 1 were absent the day Questionnaire 2 was answered.

Microsoft Excel was used to generate descriptive data for questions 15 to 17, that is, the questions which identify the participants' beliefs and domain knowledge. Questions 15 and 16 were converted into nominal data (names and categories), and question 17 was converted into ordinal data (ranking scale) (HALE; NAPIER, 2013, p. 58) to generate the percentages:

- In question 15 (*Do you think your experience, or lack of experience, in such courses or events may influence your performance as a simultaneous interpreter?*), value 1 corresponded to "yes" and value 2 corresponded to "no";
- In question 16 (*Which role do you think such courses or events represent to a simultaneous interpreter training?*), the open-ended answers were grouped into four categories (practical experience, theoretical knowledge, improvement, professional training), which summarized the participants' answers with some of the participants' answers being included in more than one category;
- In question 17 (*Check an X in the column that indicates your level of agreement with the following sentences*), each sentence received a value from 1 to 5 (1—Completely disagree, 2—Partially disagree, 3—Neither agree nor disagree, 4—Partially agree, 5—Completely agree), and separated graphs were created to each of the 13 sentences.

The recordings of the simultaneous interpreting sessions performed by 4 students from the CG and 4 students from the EG were analyzed using the software *ELAN* 5.2. The video file (.mp4 format) containing the source speech was converted into audio file (.wav format) using the software *Audacity* 2.0.6. All the interpreting sessions recorded were converted into *ELAN*-supported audio format .wav using the same software. Both source and the target speeches were transcribed.

Before the analysis of the recordings, the source and the target speeches' audios were synchronized. All the source speech's unfilled pauses and beginnings of sentences with complete ideas were marked to measure the head start. The source speech's transcription, unfilled pauses and beginnings of sentences with complete ideas were saved as a template. This template was used with all target speeches to maintain a pattern in the recordings' analysis.

In all recordings, the analysis targeted each occurrence of the strategies and markers of cognitive effort described in the Review of the Literature, namely: 1)

omission, 2) addition, 3) head start, 4) pause, 5) meaning errors and 6) logical-time sequence errors. These markers were separated for analysis purposes, but are related, closely interdependent, and influence each other, especially regarding meaning (PIO, 2003).

Omissions were identified and classified according to their type: omission of source speech's words that impaired sentence comprehension, omission of the source speech's parts of sentences that impaired comprehension of the entire segment, omission of complete sentences that impaired comprehension of the entire segment, sentence restructuring using fewer words, sentence restructuring using different words (but not necessarily fewer words). In contrast, additions were considered new material added or expanded source speech. Words and sentences whose meaning had not been explicitly uttered by the speaker constituted examples of new material.

Head start (i.e., the distance, or lag, between the speakers' input and the interpreters' output) was measured following the method described by Timarová, Dragsted and Hansen (2011). It is difficult to match source and target speech segments because they do not have exact correspondence all the time, as a result of the interpreters' linguistic restructuring. Thus, sentences were considered units, and

> [s]entence beginnings are convenient as they are relatively easy to locate in the recordings, and sentences as units are rarely missing values. Verbs are fairly numerous, and given their prominent syntactical role it is assumed they will be usually interpreted. (TIMAROVÁ; DRAGSTED; HANSEN, 2011, p. 137)

The sentences' beginnings in the source speech were marked as the initial cue of head start and the beginnings of the correspondent sentences in the target speech were marked as its final cue. Sentences completely omitted were registered as missing values (omissions), rather than as head starts. This process was carried out for the entire interpreting task to identify which parts demanded more processing effort. A threshold of four seconds was set as a head start reference value, as adopted by Lee (2002). Values above it, according to this author, might cause lack of accuracy on the target speech.

Pauses were identified following Pio (2003), with three seconds as the threshold. All the filled pauses (i.e., containing hesitations, false starts, repetitions and corrections) were excluded since they have more influence on fluency than on meaning (PIO, 2003). When the hesitations, false starts, repetitions and corrections occurred in the middle of a long pause, they were included in the pause length; when

they appeared connected to a speech segment, they were included in the speech. Although they do have an impact on the interpreters' performance and should be identified separately, it was assumed that such a procedure would not have a major impact on the present results because such items are more related to fluency than to meaning. When the pause began before the initial point of the head start, it was counted as pause and head start (pause until the initial point of the head start, and head start from this point on). Physical pauses, such as breathing or articulatory pauses, which normally last less than .25 seconds, were not counted nor analyzed.

Meaning errors included all incorrect interpreting of false cognates and words with different meaning in the source and target languages. The most important errors of this type in this study were the ones related specifically to the interpreting domain.

Logical-time sequence error was subdivided according to the effect it produced on the target speech, as proposed by Pio (2003). They were changes to the time sequence in the source speech, changes to the source speech's message, break of the logical relation across sentences (with the one before, the one after, or both), break of the logical relation within a sentence, and incompliance with the speaker's communicative intentions.

All data obtained through *ELAN* 5.2 were exported as .txt files, which were opened and manipulated as *Microsoft Excel* spreadsheets. The filter function of the software was used to obtain the number of each marker of cognitive effort (and their subcategories). Subsequently, average values and percentages were obtained for each marker (and their subcategories). In addition, graphs were generated to facilitate the comparison between the EG and the CG's data. Doubts related to the data's compilation and manipulation were discussed with the advisor.

This thesis triangulated process and product data concerning students' domain knowledge. As stated by Alves (2003), the product delivered in the target speech allows for establishing correlations between cognitive processes observed during the participants' tasks. Besides, inconsistencies between actual behavior and answers to the questionnaires are common (ERICSSON, 2000). Such inconsistencies are used in this thesis to contrast the participants' declarative knowledge and procedural knowledge.

Triangulation is a methodology which "consists of integrating qualitative and quantitative data related to the same phenomenon with a view to ensuring research

validation”[17] (DA SILVA, 2007, p. 35). Data about the same object collected and interpreted through different methods expand the researchers’ ability to observe, comprehend and explain the phenomenon they are investigating (ALVES, 2003).

The analysis of the data is reported in Chapter 4 as follows.

[17] My translation to: “Essa metodologia consiste em integrar dados qualitativos e dados quantitativos referentes a um mesmo fenômeno com o objetivo de ampliar a validação da pesquisa” (DA SILVA, 2007, p. 35).

4 DATA ANALYSIS

This chapter is divided into two sections: analysis of questionnaires (Section 4.1), and analysis of the interpreting task (Section 4.2).

4.1 Analysis of Questionnaires

The analysis of the data collected through questionnaires is subdivided into four sections: Experimental Group's profile (Section 4.1.1), Control Group's profile (Section 4.1.2), Comparison of beliefs and domain knowledge before and after formal training (Section 4.1.3), and Comparison between EG's and CG's profiles, beliefs and domain knowledge (Section 4.1.4).

4.1.1 Experimental Group's profile

Thirteen students who were attending the course "Interpreting Foundations" answered Questionnaire 1 (Q1), and eleven of them also answered Questionnaire 2 (Q2). The group's average age was 29 years old (range 20-59), and 85% of them were female. Age may be indicative of more life experience, which may have a positive influence on the interpreting performance. According to Vianna (2006), cultural knowledge only enlarges over time and may help interpreters undo misunderstandings.

All participants in this group had Portuguese as their mother tongue, English as their second language, and 50% of them also had Spanish as their third language. All of them stated they could read, speak, write and understand English well, and they had been studying English for 13 years on average. The majority, 92%, studied English at a language school. When asked about their experience abroad, 62% stated they had lived abroad, and 60% of them had lived in an English-speaking country (40% of them with the purpose of studying English). Their relatively long time of experience with English may affect their beliefs about the relationship between language skills and interpreting skills (cf. Section 4.1.4).

None of the participants in this group had experience in working as an interpreter or took part in simultaneous interpreting courses. However, 62% stated

they had already watched a speech or joined in an event about simultaneous interpreting, with all such events being Translation Conferences.

4.1.2 Control Group's profile

Ten students attending the fourth semester class of the undergraduate program in Translation at the Federal University of Uberlândia answered the questionnaire. Their average age was 24 (range 19-30), and most of them were female (80%).

All participants in this group had Portuguese as their mother tongue, English as their second language, and 50% of them had Spanish as their third language, which is a similar finding to that reported for the EG. All of them stated they could read, speak, write and understand English well, and they had been studying English for 13 years on average, which is similar to the finding reported for the EG. Most students studied English at a language school (80%) and/or by themselves (70%). Only one person stated she had lived abroad (a non-English speaking country) for 11 years. The individuals in the CG do not have as much experience abroad as those in the EG, but they have the same time of experience with English. Probably their beliefs about the relationship between language skills and interpreting skills are similar to those held by students from the EG, as discussed in Section 4.1.4.

Like in the EG, none of the participants in the CG had experience in working as an interpreter or took part in simultaneous interpreting courses. However, unlike in the EG, 90% of students in the CG stated they had already watched a speech or joined in an event about simultaneous interpreting, with all such events being Translation Conferences.

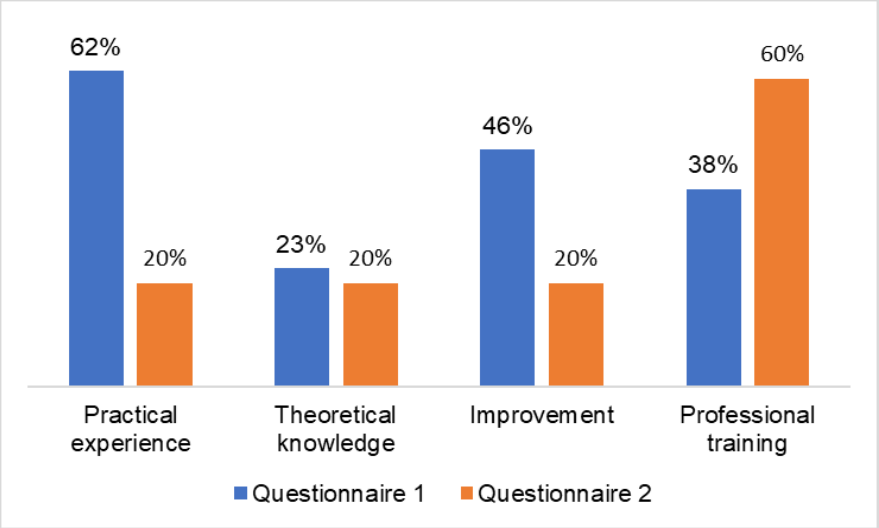
4.1.3 Comparison of beliefs and domain knowledge before and after formal training

Questionnaire 1 (Q1) was answered by the EG students before they had training in simultaneous interpreting (i.e., before acquiring domain knowledge about simultaneous interpreting), but after they had training in conference interpreting. Questionnaire 2 (Q2) was answered by the same students after they have had classes about simultaneous interpreting. The time lapse between the questionnaires' answers was one month and a half. Since the classes last four hours each, and take

place once a week, the students had 24 hours of training in simultaneous interpreting, which includes theoretical and practical activities in the syllabus.

In question 15, participants were asked if they thought their experience, or the lack thereof, in courses or events about simultaneous interpreting could influence their performance as simultaneous interpreters. In Q1 85% of them answered positively. In Q2 this number increased to 100%. Their beliefs about the importance of experience in courses and events for interpreters' performances seems to have changed after they had acquired some knowledge of simultaneous interpreting.

In question 16, students were asked about the role they thought courses and events about simultaneous interpreting play on the simultaneous interpreters' training. The answers to this open-ended question were summarized and grouped into four categories: practical experience, theoretical knowledge, improvement, and professional training. As several participants (7 in Q1, and 2 in Q2) listed more than one role, the percentage sum exceeds 100% (see Graph 1).



Graph 1 – The role students think courses and events about simultaneous interpreting play on simultaneous interpreters' training.
Source: the author.

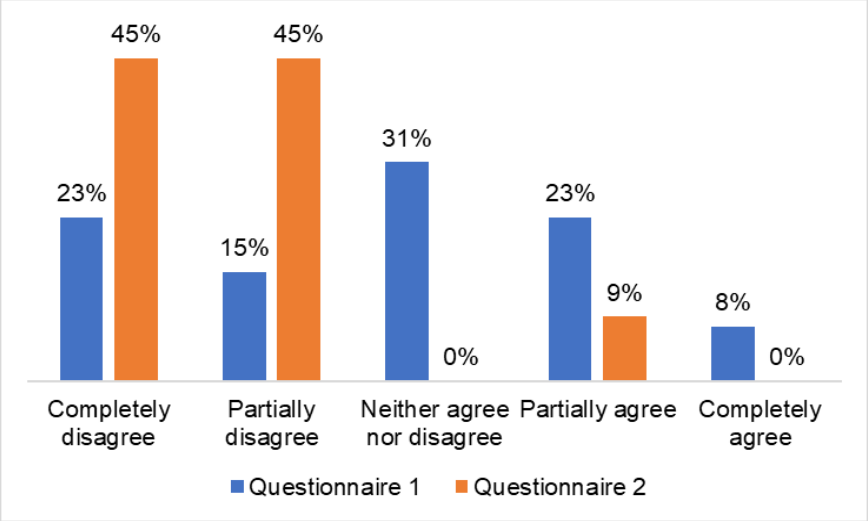
Graph 1 shows students' beliefs about simultaneous interpreting training seems to have changed after they had acquired domain knowledge of this topic. Before training, 62% of the students believed courses and events would provide practical experience to simultaneous interpreters and 46% believed they would provide improvement. In contrast, after acquiring domain knowledge, 60% of them stated such courses and events would provide professional training. Most of the

students noticed practice and improvement cannot be acquired in courses, that is, courses exist to train interpreters, rather than to promote intensive practice or to improve something already known by them. This result seems to show the students became aware that simultaneous interpreting is a complex task and that courses and events offer professional training only. The low percentage (23% in Q1 and 20% in Q2) that answered theoretical knowledge in either questionnaire seems to indicate that they do not think theoretical knowledge is important to the interpreters' professional training, that is, they believe learning theories about simultaneous interpreting is not as important as practice in simultaneous interpreting.

In question 17, students were asked to indicate their level of agreement (completely disagree, partially disagree, neither agree nor disagree, partially agree, or completely agree) with 13 statements. Nine of them (*a* to *i*) aimed to identify their beliefs about the characteristics of a good simultaneous interpreter, and six of them (*h* to *m*) were aimed to identify their domain knowledge (declarative knowledge) about simultaneous interpreting. Two of these statements (*h* and *i*) refer to both topics (beliefs and domain knowledge).

Statements 17a, 17b, 17c and 17d complemented each other. Statement 17a—a good simultaneous interpreter is someone who has a special gift to perform this task—represents one of the most common beliefs about translation/interpreting, according to Pagano (2000). Statements 17b, 17c and 17d were used to assess the students' beliefs about the relationship between performance and language: A good simultaneous interpreter is someone who masters both the mother tongue and the foreign language with which s/he is working (statement 17b); a good simultaneous interpreter is someone who has lived in a country that speaks the foreign language involved in the interpreting task (statement 17c); and a good simultaneous interpreter is someone who has linguistic knowledge of both the mother tongue and the foreign language (statement 17d).

Before the theoretical and practical training in simultaneous interpreting, the participants had varied opinions about a need for a gift to perform a simultaneous interpreting. After training, however, most of them disagreed with this idea, as shown in Graph 2.



Graph 2 – Statement 17a: A good simultaneous interpreter is someone who has a special gift to perform this task.
Source: the author.

Surprisingly, some students (9% partially agree) in the sixth semester of an undergraduate program in Translation, with only two semesters ahead of them before graduation, still believed that a special gift is necessary to be(come) a good interpreter. Even though interpreting is studied only at the end of the Translation program, it was expected that training in translation would have an impact on such a belief, as translation and interpreting are closely related tasks and lecturers try to deconstruct such a belief about translation from the very beginning in the program. It might be the case that students see interpreting as a much more difficult task than translation, and beliefs about interpreting should be targeted differently. Specific training in interpreting seems to play a role in changing beliefs, as shown in an increase from 38% to 90% disagreement with the statement in Graph 2.

Participants' beliefs about the relationship between language and performance were close to the expected from translation students. In Q1 92% of them agreed, completely (77%) or partially (15%), that a good simultaneous interpreter is someone who masters both the mother tongue and the foreign language with which s/he is working; in Q2 the overall percentage was similar, 91%, with 64% for complete agreement and 27% for partial agreement. In Q1 64% disagreed (55% completely and 9% partially) that a good simultaneous interpreter is someone who has lived in some country that speaks the foreign language involved in the interpreting task; in Q2 this number increased to 77% (31% completely disagreed, and 46% partially disagreed). In Q1 92% of the students agreed (69%

totally and 23% partially) that a good simultaneous interpreter needs linguistic knowledge of both the mother tongue and the foreign language; in Q2 the percentage increased to 100% (64% completely agreed, and 36% partially agreed).

Two participants left comments related to statements 17a, 17b, 17c and 17d (students' beliefs about the relationship between performance and language). Their comments seem to be representative of the percentages found:

> SWT91: "I do not believe in 'gift,' but in inclination to do any task. Likewise, disposition (in all its possible meanings) is also needed in interpreting, a lot of world knowledge and, mainly, excellent domain of the target language, without demeaning domain of the source language, which must be enough for a good comprehension of the source speech."[18]
>
> SWT131: "I believe living abroad may be a plus, but it is not the rule. Because you may be able, perhaps, to understand accents, or it may be easier to understand what is being said. However, it is not the only thing that makes someone a good interpreter. There are abilities beyond that."[19]

Statements 17e to 17i were related to students' beliefs about simultaneous interpreting performance and training. In Q1 92% participants disagreed, 46% completely and 46% partially, with statement 17e, i.e., a good simultaneous interpreter is someone concerned with reproducing exactly what the speaker is saying. In Q2 the overall percentage was similar, 92%, with 55% of the participants completely disagreeing and 36% partially disagreeing. As the number of complete disagreement was higher in Q2, it seems that, with theoretical and practical training in simultaneous interpreting, the students became more certain that interpreters cannot reproduce every word uttered by the speaker.

The results for statements 17f, 17g and 17h were similar in Q1 and Q2. In both Q1 and Q2, all participants completely agreed with statement 17f, i.e., a good simultaneous interpreter is someone concerned with making the listener understand what is being said in the speech. In Q1 all participants, 82% completely and 15% partially, agreed with statement 17g, i.e., a good simultaneous interpreter is someone who knows interpreting theories and strategies to perform with quality; surprisingly, the percentage decreased in Q2, with 82% of the participants completely agreeing with the statement. In both Q1 and Q2, all participants agreed with statement 17h,

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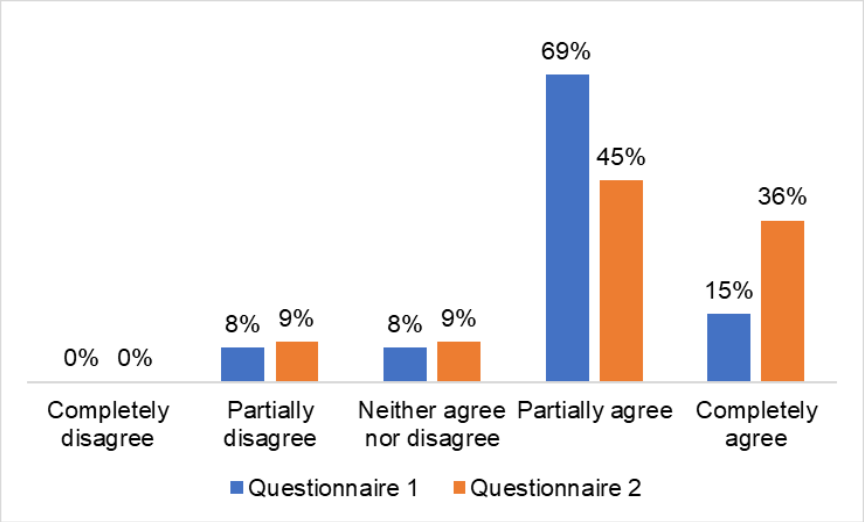
[18] My translation to: "não acredito em dom, mas em disposição para se realizar qualquer atividade. Assim, também com a interpretação é preciso disposição (em todos os sentidos possíveis), muito conhecimento de mundo e, principalmente, domínio exemplar da língua de chegada, sem menosprezar o domínio da língua de partida, que deve ser suficiente para uma boa compreensão do discurso de partida."

[19] My translation to: "acredito que morar fora seja um diferencial, mas não a regra. Por ter maior capacidade, talvez, de entender sotaques ou facilidade de compreensão do que está sendo dito. Porém, não é só isso que faz de alguém um bom intérprete. Há habilidades que vão além."

i.e., a good simultaneous interpreter should prepare herself/himself to interpret by researching about the topic of the speech (92% completely agreed and 8% partially agreed in Q1, and 100% completely agreed in Q2). The fact that all the students completely agreed with Statement 17h in Q2 seems to point to a change in the students' beliefs as a result of formal training.

Statements 17h to 17m were concerned with the participants' beliefs about domain knowledge. Statement 17h, as shown previously, revealed that students believe that having domain knowledge of the session theme influences the quality of the interpreters' performance. Statement 17i asserted that a good simultaneous interpreter must have good knowledge of the speech's theme to perform adequately. Most students agreed with this statement, but they were not completely sure about it, as shown in Graph 3.

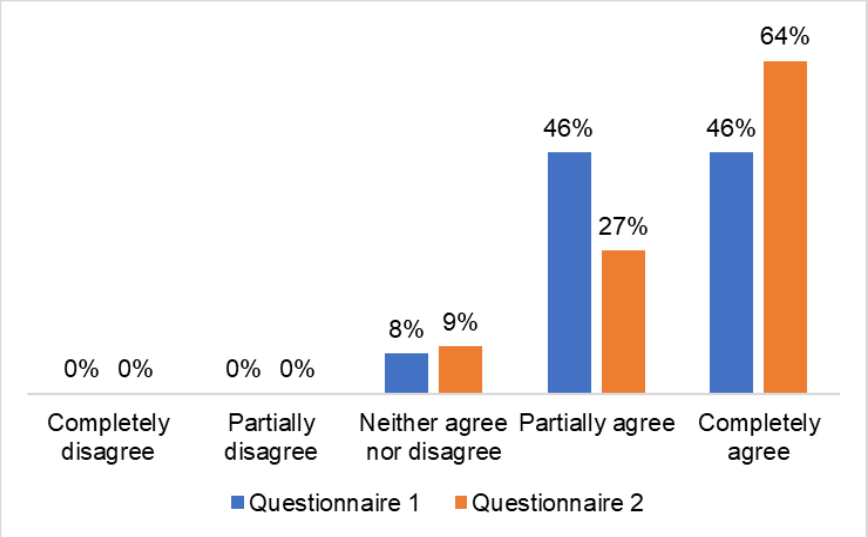


Graph 3 – Statement 17i: A good simultaneous interpreter must have good knowledge of the speech's theme to perform adequately.
Source: the author.

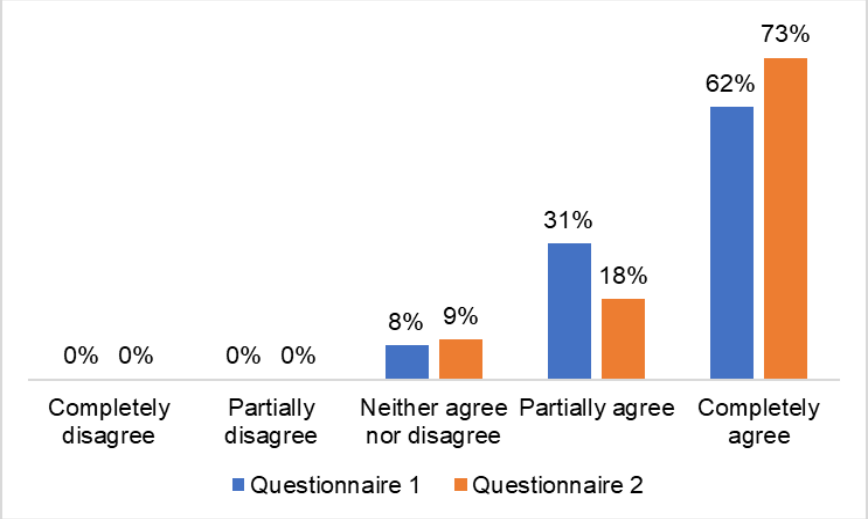
In Q1, 69% of the students partially agreed with this statement, and 15% completely agreed with it. In contrast, in Q2, 45% of them partially agreed and 36% completely agreed with the statement. Despite the increase in complete agreement from Q1 to Q2, the result was not as expected.

Statements 17j and 17k also prompted surprising; they read as follows: The simultaneous interpreter who has good knowledge of the speech theme resorts to fewer interpreting strategies (Statement 17j); the simultaneous interpreter who has good knowledge of the speech theme solves interpreting problems more easily than

the one who does not know anything about the theme (Statement 17k). Most students agreed with both statements, as shown in Graphs 4 and 5. Nevertheless, the results are contradictory: If the students did believe interpreters with good domain knowledge of the speech uses more interpreting strategies, the logical rationale would be that such interpreters would also have less difficulty in solving interpreting problems.



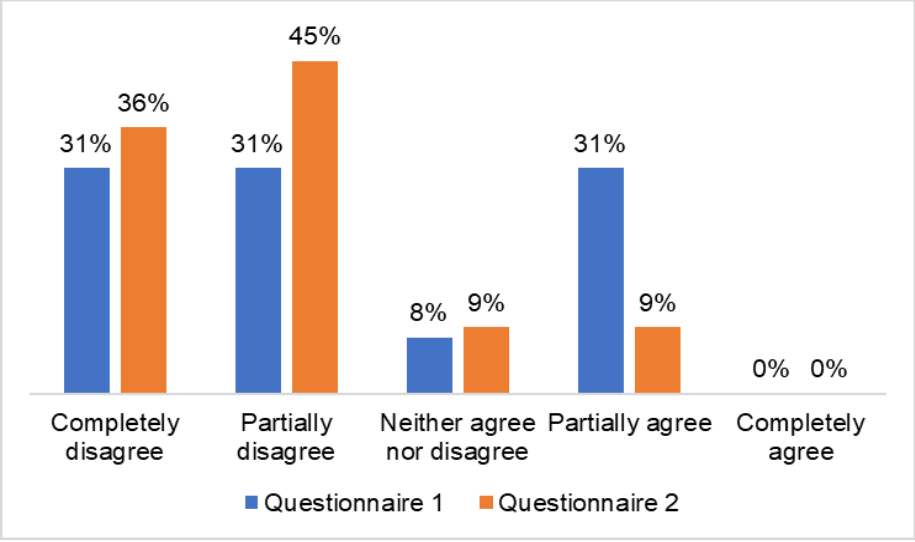
Graph 4 – Statement 17j: The simultaneous interpreter who has good knowledge of the of theme resorts to fewer interpreting strategies.
Source: the author.



Graph 5 – Statement 17k: The simultaneous interpreter who has good knowledge of the speech theme solves interpreting problems more easily than the one who does not know anything about the theme.
Source: the author.

Statements 17l and 17m complemented each other and read as follows: A cardiologist who masters a foreign language will perform the simultaneous interpreting of a conference about Cardiology more easily than an interpreter (Statement 17l); the quality of the simultaneous interpreting of a conference about Cardiology performed by a cardiologist who masters the foreign language will be superior to that performed by an interpreter (Statement 17m). Such statements were designed to assess the students' beliefs about the importance of domain knowledge to the interpreters' performance. They both implied that linguistic knowledge and domain knowledge of the speech theme are more important than domain knowledge of simultaneous interpreting.

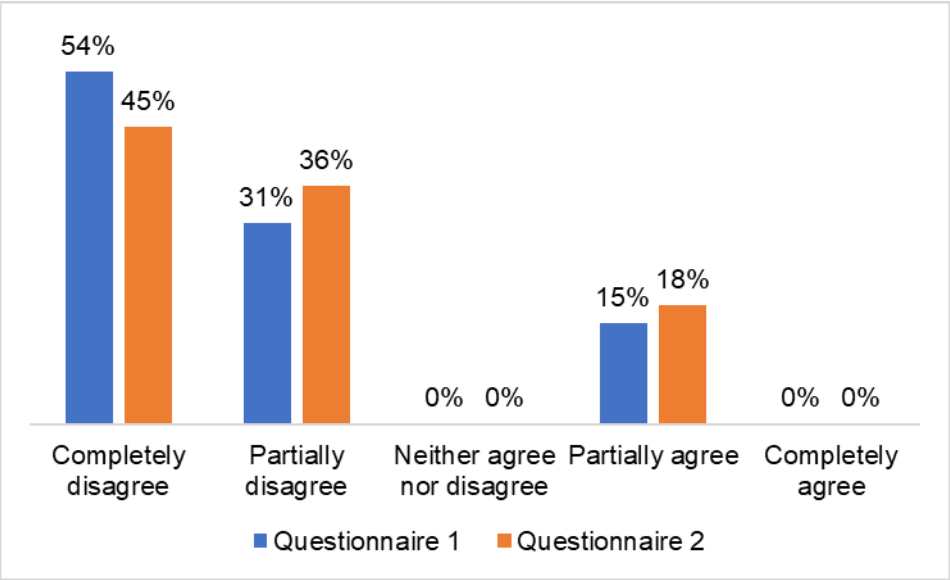
Most students disagreed with Statement 17l (62% in Q1, and 81% in Q2). Although the percentage of disagreement increased in Q2, 9% of the students agreed that a non-interpreter who has domain knowledge of the topic and masters a foreign language can perform better an interpreting task than an interpreter (see Graph 6). In other words, some students believe that linguistic knowledge and domain knowledge of the speech theme are more important than domain knowledge of simultaneous interpreting.



Graph 6 – Statement 17l: A cardiologist who masters a foreign language will perform a better simultaneous interpreting of a Cardiology conference. Source: the author.

Finally, statement 17m showed some students have the deep-routed belief that linguistic knowledge is more important than domain knowledge of simultaneous interpreting, even though they were approaching graduation. In Q2 18% of the

students agreed that a person who masters a foreign language will deliver better than an interpreter. In fact, the most surprising result was that this percentage was higher in Q2 than in Q1 (15%), as shown in Graph 7.



Graph 7 – Statement 17m: The quality of the simultaneous interpreting of a Cardiology conference performed by a cardiologist who masters the foreign language will be superior to that performed by an interpreter.
Source: the author.

4.1.4 Comparison between EG's and CG's profile, beliefs and domain knowledge

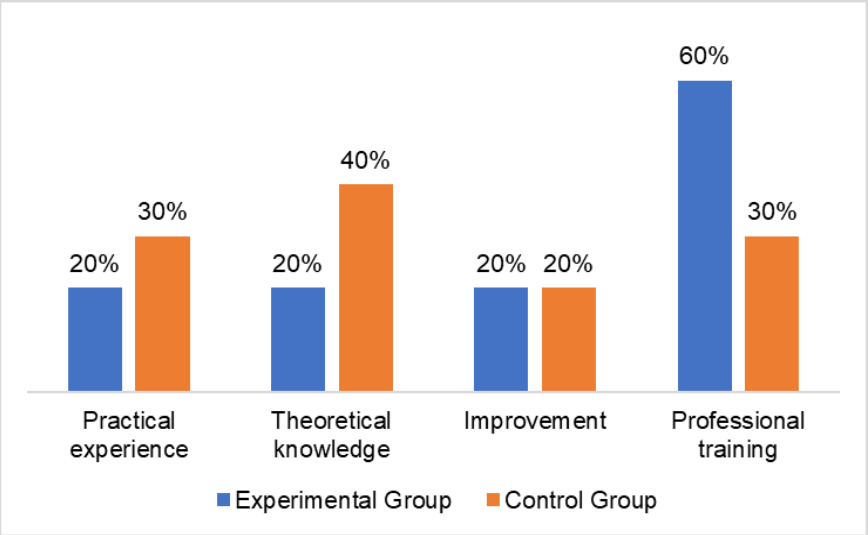
The total number of students who answered the questionnaires was 11 for EG's Q2 and 10 for CG. Q2 was used in this analysis because it was answered after EG's students had acquired domain knowledge of simultaneous interpreting.

The CG's and EG's profiles were similar. The most significant differences were: 64% of the students in the EG had lived abroad, against 10% of the students in the CG; and 55% of the students in the EG had attended events or courses about simultaneous interpreting, against 90% of the students in the CG. This may affect how both groups see the effect of linguistic knowledge and domain knowledge of simultaneous interpreting on the simultaneous interpreter's performance.

In question 15, the students were asked if they think their experience, or the lack thereof, in courses or events about simultaneous interpreting could influence their performance as simultaneous interpreters. All participants in both groups completely agreed with this. A possible account for the answers in CG is as follows: Even though the students in this group had not attended any required undergraduate

course about interpreting, 90% of them had been to events about simultaneous interpreting.

In question 16, the participants were asked about the role they think that courses and events about simultaneous interpreting play on the simultaneous interpreter's training. The answers were grouped into four categories: practical experience, theoretical knowledge, improvement, and professional training. Some participants (2 in EG, and 1 in CG) listed more than one role, and therefore, the percentage sum exceeds 100% (see Graph 8).

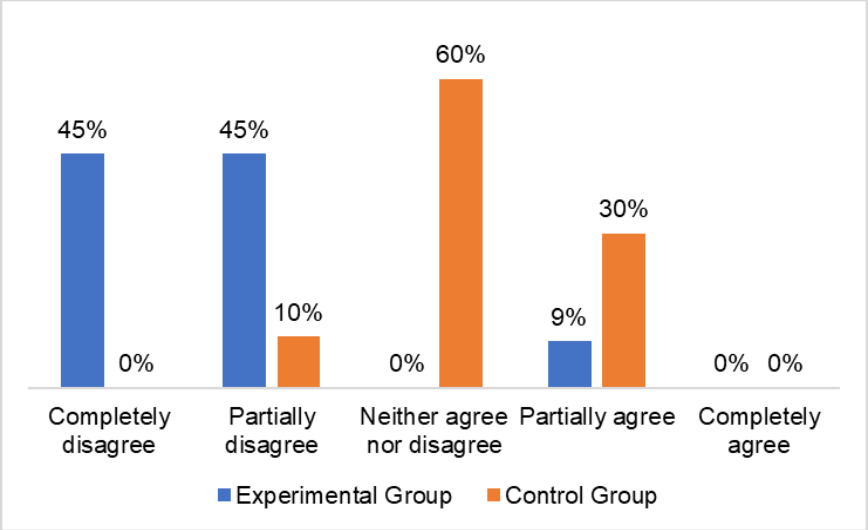


Graph 8 - The role students think courses and events about simultaneous interpreting pay on simultaneous interpreters' training.
Source: the author.

Graph 8 shows the students' beliefs about simultaneous interpreting training were different from one group to another. Most students in the EG (60%) believed courses and events would provide professional training to the simultaneous interpreter. The answers in the CG were relatively balanced, but most of the students (40%) believed such courses and events would provide theoretical knowledge. This shows students with no formal training in interpreting tend to believe such courses and events provide theoretical knowledge, but no practice, while students with formal training stated such courses are focused on professional training, rather than on theory.

In question 17, students were asked to indicate their level of agreement (completely disagree, partially disagree, neither agree nor disagree, partially agree, or completely agree) with 13 statements. Most students in the EG (90%) disagreed

with Statement 17a (a good simultaneous interpreter is someone who has a special gift to perform this task). In contrast, most students in the CG (60%) neither agreed nor disagreed with this idea, while 30% partially agree with it (see Graph 9). This difference seems to reflect the influence that theoretical and practical training in simultaneous interpreting has on the students' beliefs.

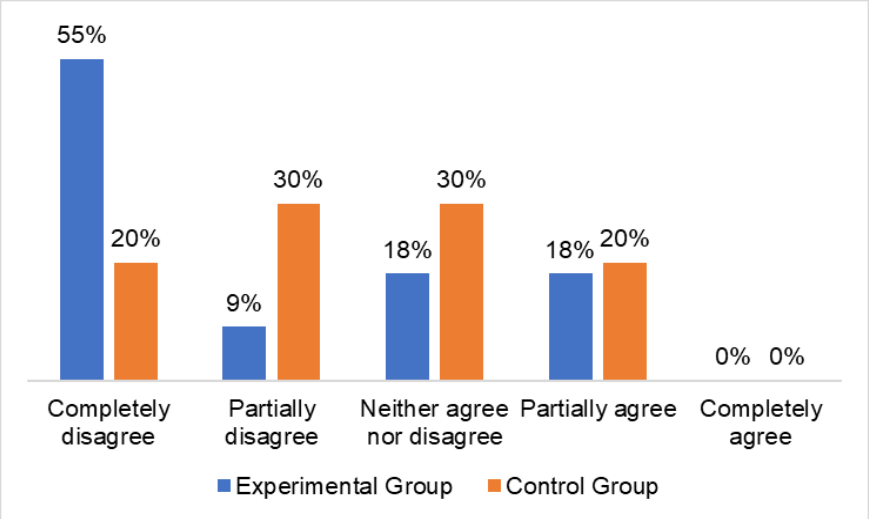


Graph 9 – Statement 17a: A good simultaneous interpreter is someone who has a special gift to perform this task.
Source: the author.

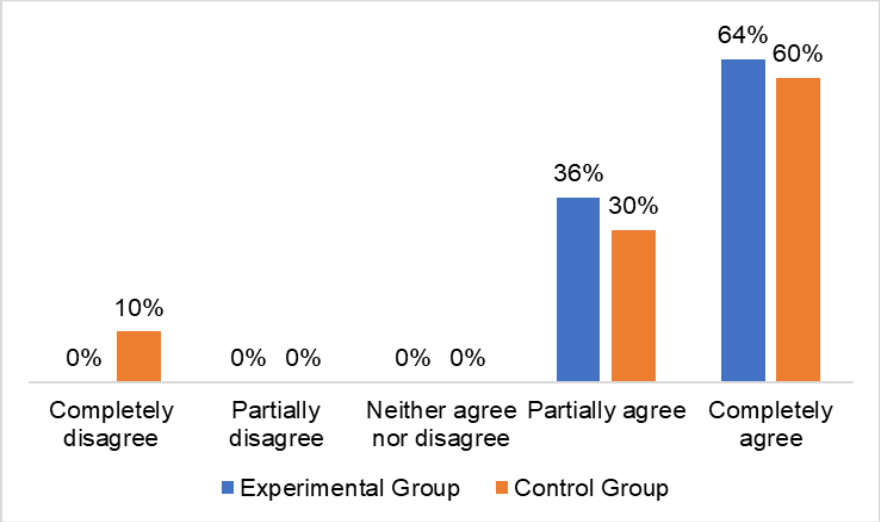
In the EG, 91% of the participants agreed, completely (64%) or partially (27%), that a good simultaneous interpreter is someone who masters both the mother tongue and the foreign language with which s/he is working (Statement 17b). The percentage was similar in the CG: 90% agreed with it (i.e., 40% completely agreed, and 50% partially agreed).

In the EG, 64% of the students disagreed, 55% completely and 9% partially, that the good simultaneous interpreter is someone who has lived in some country that speaks the foreign language involved in the interpreting task (Statement 17c). In the CG, the figure was less clear (see Graph 10), which might be related to the fact that only 10% of students in the CG had lived abroad.

All students in the EG agreed (64% totally and 36% partially) that a good simultaneous interpreter must have linguistic knowledge of both mother tongue and foreign language. In contrast, 10% of the students in the CG disagreed with this idea, which seems to indicate that students from the CG are not certain of the role of linguistic knowledge (see Graph 11).



Graph 10 – Statement 17c: A good simultaneous interpreter is someone who has lived in some country that speaks the foreign language involved in the interpreting task.
Source: the author.

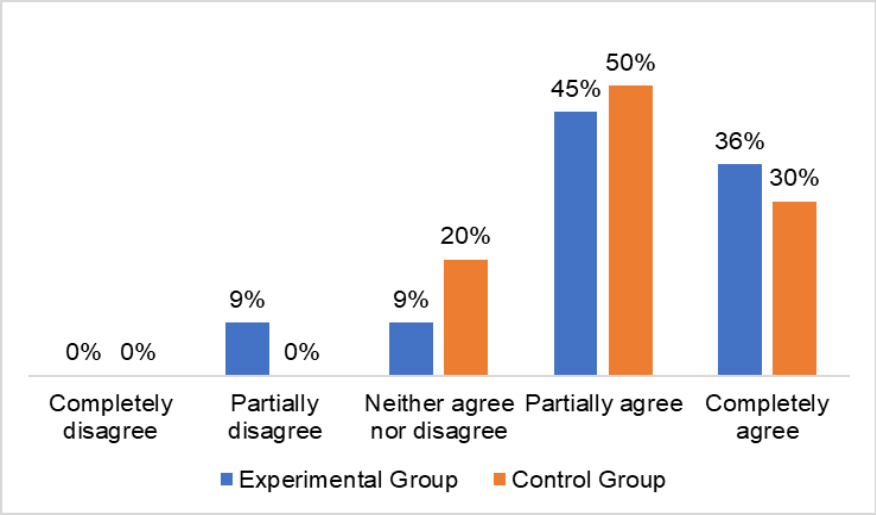


Graph 11 – Statement 17d: A good simultaneous interpreter is someone who has linguistic knowledge of both the mother tongue and the foreign language

Most participants in the EG disagreed (55% completely and 36% partially) with Statement 17e (i.e., a good simultaneous interpreter is someone concerned with reproducing exactly what the speaker is saying). In the CG, 20% of the students disagreed completely and 40% disagreed partially with this statement. A high percentage of agreement (30%) in the CG seems to indicate a meaningful number of students believe that interpreters should reproduce every word said by the speaker.

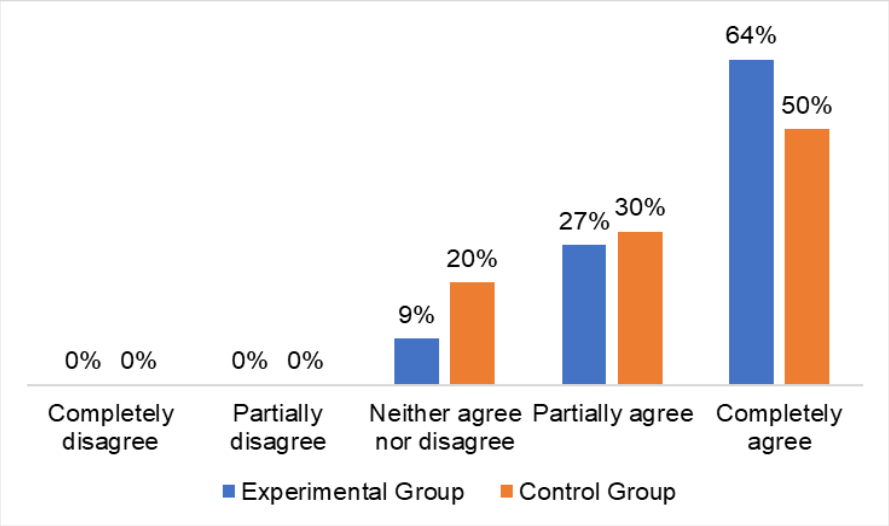
Similar results were found for Statements 17f, 17g and 17h in both EG and CG. All participants agreed with Statement 17f (a good simultaneous interpreter is someone concerned with making the listener understand what is being said in the speech). All students in the EG and 91% of the students in the CG agreed with Statement 17g (a good simultaneous interpreter is someone who knows interpreting theories and strategies to perform it with quality). All students in both groups agreed with Statement 17h (a good simultaneous interpreter should prepare herself/himself to interpret by researching about the topic of the speech). This finding seems to indicate the students are aware of the role preparation plays in the interpreter's performances, even if they are in the fourth semester of the undergraduate program in Translation and have not completed an interpreting course yet.

Statements from 17h to 17m were concerned with the participants' beliefs about domain knowledge (of simultaneous interpreting). All participants believe that having domain knowledge of the session topic influences the quality of interpreters' performance (Statement 17h). Most students agreed, in both groups, with statement 17i (a good simultaneous interpreter must have good knowledge of the speech theme to perform adequately), but they were not completely sure about it, as shown in Graph 12. Participants in the CG were more uncertain of this idea, since 50% of them agreed partially with the statement. This was an expected result for the participants in the CG, since they had no theoretical and practical training in simultaneous interpreting.

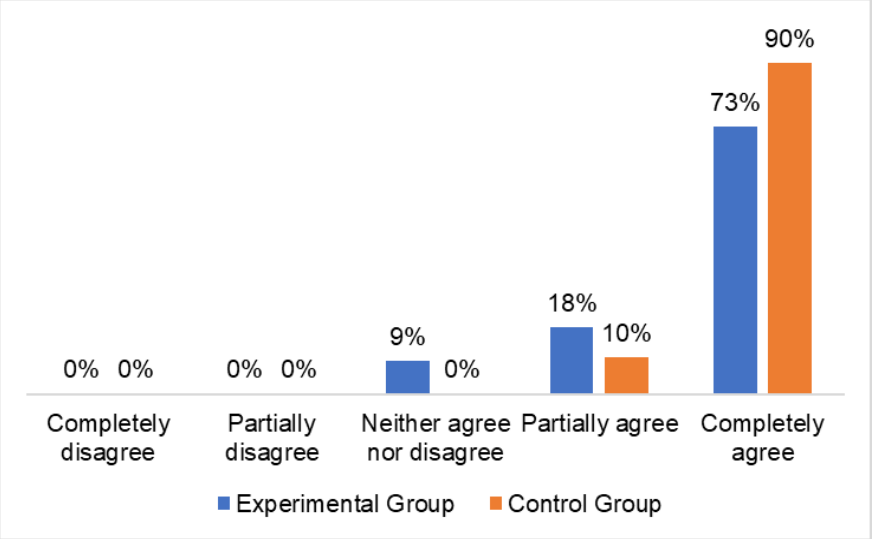


Graph 12 – Statement 17i: A good simultaneous interpreter must have good knowledge of the speech's theme to perform adequately.
Source: the author.

The similarities between the results from both groups for Statements 17j (the simultaneous interpreter who has good knowledge of the speech theme resorts to fewer interpreting strategies) and 17k (the simultaneous interpreter who has good knowledge of the speech theme solves interpreting problems more easily than the one who does not know anything about the theme) were surprising. The fact that most students in the CG agreed with the statement was expected, but compared to students in the EG, they were more uncertain of the role of domain knowledge of simultaneous interpreting (50% of them completely agreed, and 30% partially agreed) when it is related to interpreting strategies, as shown in Graph 13. This may be related to the fact that students in the CG had not had any theoretical or practical training in interpreting yet. Interestingly, however, they were certain that domain knowledge could help interpreters solve interpreting problems. All students agreed with this idea (90% of them completely, and 10% partially), as shown in Graph 14.



Graph 13 – Statement 17j: The simultaneous interpreter who has good knowledge of the speech theme s/he resorts to fewer interpreting strategies.
Source: the author.



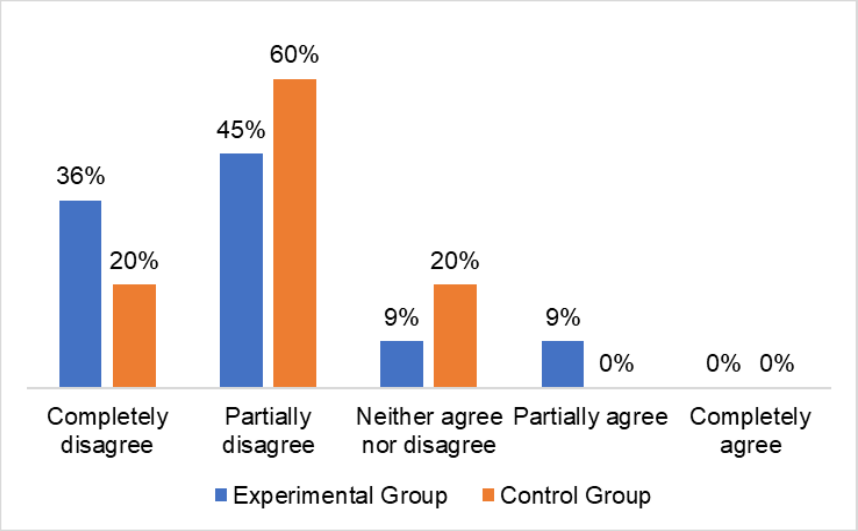
Graph 14 – Statement 17k: The simultaneous interpreter who has good knowledge of the speech theme solves interpreting problems more easily than the one who does not know anything about the topic.
Source: the author.

The results, as mentioned before about EG's results in section 4.1.3, seem to be contradictory. If the students did believe that interpreters who have good domain knowledge of the speech to be interpreted uses more interpreting strategies, it should follow that such interpreters would have less difficulties in solving interpreting problems. The present finding shows the participants did not have a good understanding of the role of domain knowledge of simultaneous interpreting or of what interpreting strategies might be.

Statements 17l and 17m were designed to assess the students' beliefs about linguistic and domain knowledge (of the topic of the speech, rather than about simultaneous interpreting). Statement 17l reads: "A cardiologist who masters a foreign language will perform a simultaneous interpreting of a Cardiology conference more easily than an interpreter." Statement 17m reads: "The quality of the simultaneous interpretation of a Cardiology conference performed by cardiologist who masters the foreign language will be superior to that performed by an interpreter."

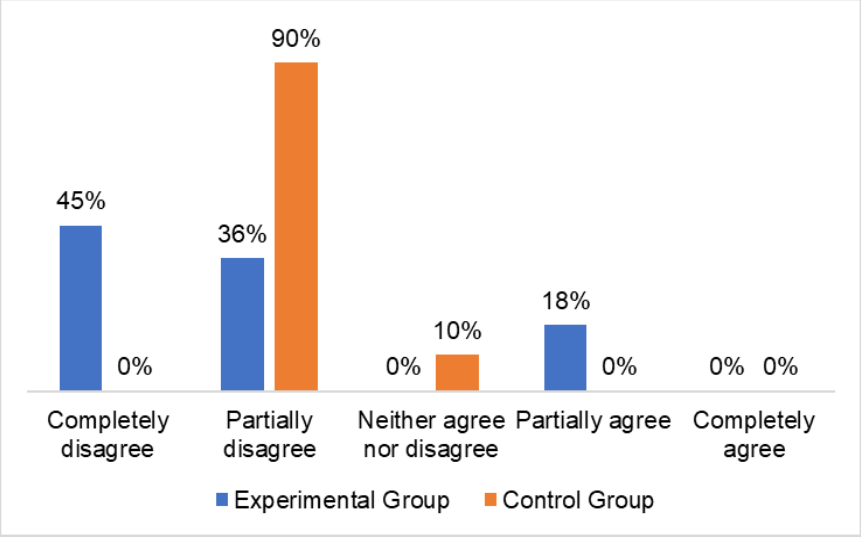
Most students in both groups disagreed with statement 17l (81% in the EG, and 80% in the CG). Besides, 9% of the students in the EG partially agreed with the statement, and the remaining 20% in the CG neither agreed nor disagreed with it. These results show more CG students, compared to EG students, have a belief that domain knowledge of simultaneous interpreting is more important than linguistic

knowledge and knowledge of the topic, as shown in Graph 15. This is an unexpected result, since the CG students had not had any theoretical and practical training in simultaneous interpreting yet, and the EG students already had it.



Graph 15 – Statement 17l: A cardiologist who masters a foreign language will interpret simultaneously a Cardiology conference more easily than an interpreter.
Source: the author.

Finally, the results for Statement 17m showed that, when compared to the EG students, the CG students seem to slightly have preferable beliefs about the influence of linguistic and domain knowledge (of the topic of the speech, but not about simultaneous interpreting), even without theoretical and practical training in simultaneous interpreting. This inference builds on the percentage of EG students (18%) who agreed with the statement that a person who masters a foreign language will provide a better delivery than an interpreter, and on the percentage of CG students (90%) who disagree with this statement, as shown in Graph 16.



Graph 16 – Statement 17m: The quality of the simultaneous interpreting of a Cardiology conference performed by a cardiologist who masters the foreign language will be superior to that performed by an interpreter.
Source: the author.

4.2 Analysis of the Interpreting Task

This section reports the data collected through recordings of a simultaneous interpreting task performed by students from the EG and the CG. Each sub-section contains tables with the values found for each one participant and the average values found for each group when it comes to the markers of cognitive effort. Comparisons between EG and CG are also presented through tables and graphs with the average values of each marker. The analysis is subdivided into three sections: Experimental Group's data (Section 4.2.1), Control Group's data (Section 4.2.2), and comparison between Experimental Group and Control Group (Section 4.2.3).

4.2.1 Experimental Group's data

This section reports the results for the EG, with each table containing data per participant (SWT1, SWT2, SWT3, SWT4) and the average values for the group.

Table 1 shows the results for *omission*.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of omissions	25	26	13	22	22
Omission of source speech words that impaired sentence comprehension	8%	4%	0%	0%	3%
Omission of source speech sentence parts that impaired comprehension of the entire segment	28%	12%	0%	5%	11%
Omission of complete sentences impaired the comprehension of the entire segment	52%	31%	38%	23%	36%
Restructuring of sentences using fewer words	12%	54%	62%	73%	50%
Restructuring of sentences using different words (but not necessarily fewer words)	0%	0%	0%	0%	0%

Table 1 - Experimental Group's omissions
Source: the author.

On average the group omitted 22 times (range 13-26), with SWT3 resorting much less to this strategy than her counterparts.

Removal of repetitive, redundant and less important information, long clauses, full sentences (GILE, 2011), words with high information relevance, clauses, phrases, entire sentences which were either highly informative or rhetoric (PIO, 2003) were considered omissions. Based on these types of omission, the occurrences were grouped into five categories as follows:

- Omission of source speech words that impaired sentence comprehension represented, on average, 3% of all omissions, but two participants had none of such type of omission (SWT3 and SWT4);
- Omission of source speech sentence parts that impaired the comprehension of the whole segment, represented, on average, 11% of all omissions, but SWT3 had none of such type of omission, while SWT1 had 28%;
- Omission of complete sentences that impaired comprehension of the entire segment, represented, on average, 36% of all omissions (range 23-52%);
- Restructuring of sentences using fewer words was responsible for the other 50% of all omissions on average, but the percentage for SWT1 was low (12%), which could have caused more time spent on pauses during the speech, and more logical-time sequence errors;
- Restructuring of sentences using different words (but not necessarily fewer words) was non-existent in the sample.

These data seem to indicate that half of the omissions were deliberately done as an interpreting strategy, since they did not impair comprehension of the target speech. The other half can be considered errors, for they impaired the comprehension of the target speech and, in some cases, occurred alongside logical-time sequence errors, which compromised the comprehension of the target speech. This finding also seems to reveal domain knowledge of simultaneous interpreting did not help students from the EG to avoid omission as an error. This is more apparent for SWT1, with 88% of omissions as errors, while SWT2 had the lowest percentage.

Table 2 presents the results for *addition*.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of additions	2	1	2	3	2

Table 2 - Experimental Group's additions
Source: the author.

The EG made two additions on average (range 1-3), i.e., added new material to or expanded the source discourse (LI, 2013). The small number of additions may be indicative that this group did not resort to neutral information as a remedy for previous omission (BARIK, 1994). In other words, it seems to indicate such students did not use addition as a strategy to correct mistakes made after poor omissions, since the number of omissions were much higher than the number of additions.

Table 3 presents the results for *head start*. The average number of head start throughout the target speech was 51 (range 49-43). The average head start length was 3.4 seconds (range 2.9-3.8), which is within the acceptable value (2 to 5 seconds) according to Lee (2002), but the shortest head start (0.9 seconds on average, range 0.7-1.2) and the longest head start (7 seconds on average, range 4.5-10.5) were outside this range. This holds true for the individual and overall values, except for SWT2's longest head start.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of head starts	50	49	53	53	51
Shortest head start (in seconds)	1	0.8	0.7	1.2	0.9
Longest head start (in seconds)	10.5	4.5	6.6	7	7
Average head start length (in seconds)	2.9	3	3.7	3.8	3.4
Percentage of head starts above 4 seconds	16%	10%	21%	28%	19%

Table 3 - Experimental Group's head start
Source: the author.

Long head start (over 4 seconds) may cause errors because it might indicate the interpreter could have found a problem and did not know how to solve it. In other words, it may indicate cognitive processing. On average 19% (range 20-28%) of all head starts produced by the students in the EG lasted over 4 seconds. This is a high percentage for a group that had had training simultaneous interpreting and was expected to have learnt strategies to avoid increased head start.

Table 4 provides the results for *pause*.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of pauses	43	36	39	35	38
Shortest pause (in seconds)	0.5	0.3	0.3	0.3	0.4
Longest pause (in seconds)	6.7	5.3	2.1	6.5	5.2
Average pause length (in seconds)	2.3	2.1	1.4	2.7	2.1
Pauses longer than 3 seconds	16%	8%	0%	9%	8%

Table 4 - Experimental Group's pauses
Source: the author.

The number of pauses was 38 on average (range 35-43). This number excludes hesitations, false starts, repetitions, and corrections. Several pauses also corresponded to head start marks, therefore, they were also excluded.

Pause length was 2.1 seconds on average (range 1.4-2.7). This length is within the range proposed by Pio (2003), according to whom pauses should last 3 seconds maximum in simultaneous interpreting. However, three participants had pauses longer than that (SWT1, SWT2, SWT4), while SWT3's longest pause was 2.1. The average found for the shortest pauses was 0.4 seconds (range 0.3-0.5), and the average found for the longest pauses was 5.2 seconds (range 2.1-6.7).

According to Schilperoord (1996), long pauses indicate a more effortful cognitive process, that is, the translator is searching for planning strategies to solve a problem. It can also be applied to interpreting. On average 8% of all pause time produced by students in the EG lasted longer than 3 seconds (range 0-16%). This low value might be indicative that the participants' domain knowledge of simultaneous interpreting helped them find strategies to solve interpreting problems.

Table 5 reports the results for *meaning error*, which included all incorrect interpreting of false cognates and words with different meaning in the source and in the target speeches. The most important in this study were the ones related specifically to the interpreting domain.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of meaning errors	4	7	5	4	5

Table 5 - Experimental Group's meaning errors
Source: the author.

On average EG made five meaning errors (range 4-7), some of which were related to domain knowledge. Half of the students from EG used “translation” instead of “interpreting” (SWT1), “translate” instead of “interpret” (SWT1), and “types” instead of “modes” (SWT1 and SWT2) (when talking about differences between consecutive interpreting and simultaneous interpreting). This finding seems to point to poor domain knowledge of simultaneous interpreting.

Table 6 provides the results for *logical-time sequence error*. Such errors are discontinuities that change the logical relation between source speech information units in the target speech (logical sequence) or change time references (time sequence) in the target speech (PIO, 2003). Fragmented utterances and unfinished sentences were considered logical sequence errors, while errors in verb tenses and modes, as well as changes to time references were considered time sequence errors.

Variable	SWT1	SWT2	SWT3	SWT4	Average
Total number of logical-time sequence errors	29	30	16	24	25
Changes to the time sequence of the source speech	28%	17%	19%	13%	19%
Changes to the message of the source speech	59%	47%	56%	30%	48%
Break of logical relations between sentences (with the one before, the one after, or both)	24%	40%	31%	50%	36%
Break of logical relations within a sentence	3%	13%	6%	12%	9%
Incompliance with the speaker's communicative intentions	3%	20%	25%	4%	13%

Table 6 - Experimental Group's logical-time sequence errors
Source: the author.

The EG made, on average, 25 logical-time sequence errors, with SWT3 producing the lowest number of errors (16), while SWT4, SWT1 and SWT2 produced 24, 29 and 30 errors, respectively. Due to this, SWT3 speech was easier to comprehend than the others. Such errors were grouped into five categories, according to their impact on the target speech, namely: errors that changed the time sequence presented by the source speech, errors that changed the message of the source speech, errors that broke the logical relations between sentences (with the one before, the one after, or both), errors that broke the logical relations within a

sentence, and errors of incompliance with the speaker's communicative intentions. Sometimes, different categories occurred in the same segment, which explains why the sum of all values exceeds 100% in each column.

On average, 9% of the errors broke the logical relations within a sentence, and consequently produced non-fluent sentences that were difficult to understand. For example, SPW4 delivered, “a tradução você vê, ‘tá feita por feita e você manda para o seu cliente” [“the translation you see, it’s done by done, and you send to your client”] while interpreting “they’ve done it well, it’s perfect, they can send it off to their customer.” The number of such errors was higher for SWT2 and SWT4 (13% and 12%, respectively) than for SWT1 (3%) and SWT3 (6%). As a result, SWT1 and SWT3 speeches presented more complete sentences.

On average, 13% of the errors entailed incompliance with the speaker's communicative intentions. However, such errors were more common for SWT2 (20%) and SWT3 (25%) than for SWT1 (3%) and SWT4 (4%). In most times, this error changed the way the target audience understands the source speech. For example, SWT2 rendered, “o intérprete tira notas” [“the interpreter gets grades”] in her interpreting of “the interpreter takes notes.”

On average, 19% of the errors changed the time sequence presented by the source speech (range 13-28%). For example, SWT2 said, “lugares que você não, nunca se imaginou indo como um intérpretes” [“places that you haven’t, never imagined you’d go as a interpreters” (sic)], in her interpreting of “you would never have seen if you weren’t an interpreter.” This segment presents change of verb mode and, consequently, change of the idea expressed by the speaker.

On average, 36% of the errors involved breaking the logical relations between sentences (with the one before, the one after, or both), thereby causing discontinuities in the target speech. For example, SWT1 said: “outro aspecto da interpretação é que você viaja muito, reuniãos... você trabalha pela Europa, pelo mundo” [another aspect of interpreting is that you travel a lot, meetins (sic)… you work across Europe, around the world”] in her interpreting of “another aspect of interpreting is we tend to travel a lot, meetings don’t take place outside your house, you might find yourself travelling all around Europe or all around the world.” It exemplifies the lack of connections between the sentences, causing difficulties for the listeners to understand the speaker’s idea. The listener could understand that all interpreters travel around the world or around Europe.

Finally, 48% of the errors entailed changes to the message of the source speech. For example, SWT3 said: “e conhecemos pessoas importantes, às vezes, pessoas que estão na televisão sempre” [“and we know important people sometimes, people that are always on television”] in her interpreting of “you might meet all kinds of VIPs who you otherwise only see on television.” The idea that one can only see this type of people if you are an interpreter is not expressed in the target language. This type of error could lead the listeners to have a wrong understanding of the source speech.

4.2.2 Control Group’s data

This section reports on the results for the CG, with each table containing data per participant (SOT1, SOT2, SOT3, SOT4) and the average values for the group.

Table 7 exhibits the results for *omission*. This group made, on average, 25 omissions (range 22-29). The omission of source speech words that impaired sentence comprehension was found in only one participant (SOT3). This holds also true for the omission of source speech sentence parts that impaired the comprehension of the entire segment, which was found for SOT1 only. The omission of complete sentences that impaired the comprehension of the entire segment represented, on average, 28% of all omissions (range 17-39%). Overall, these three types of omission represented, on average, 30% of all omissions.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of omissions	23	22	26	29	25
Omission of source speech words that impaired sentence comprehension	0%	0%	4%	0%	1%
Omission of source speech sentence parts that impaired comprehension of the entire segment	4%	0%	0%	0%	1%
Omission of complete sentences impaired the comprehension of the entire segment	39%	36%	19%	17%	28%
Restructuring of sentences using fewer words	43%	55%	73%	76%	62%
Restructuring of sentences using different words (but not necessarily fewer words)	13%	9%	4%	7%	8%

Table 7 - Control Group's omissions
Source: the author.

Restructuring of sentences using fewer words was responsible for 62% of all omissions, while restructuring of sentences using different words (but not necessarily fewer words) accounted for 8% of all omissions. Most of these restructuring of

sentences happened alongside other cognitive effort markers, such as logical-time sequence errors, causing, consequently, difficulties in the comprehension of the target speech. It seems to reveal, thus, that the lack of domain knowledge of simultaneous interpreting, especially procedural knowledge, had a negative impact on the students' performances.

Table 8 provides the results for *addition*.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of additions	9	10	7	14	10

Table 8 - Control Group's additions
Source: the author.

The group added new material to or expanded the source discourse 10 times on average (range 7-10). This number of additions could be indicative that the students tried to correct previous omissions by adding something that was not explicitly realized in the source speech, that is, they used addition as a strategy to correct the mistakes made after a poor omission. However, a qualitative analysis of corrections using additions pointed out they were all poor, with other errors following the additions. For example, SOT2 added, "a pessoa não quer ser um intérprete" ["the individual does not want to be an interpreter"] after the speaker uttered "well, it's people who like the stress, the excitement in interpreting, it's you there, you're in the hot seat, you have got to understand what the other person is saying and interpret it straight away." In this case, the entire utterance was omitted before such an addition.

Table 9 presents the results for *head start*.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of head starts	44	47	51	48	48
Shortest head start (in seconds)	1.5	0.8	1.5	0.5	1.1
Longest head start (in seconds)	13.4	6.1	8.1	6.9	8.6
Average head start length (in seconds)	5.2	4.1	4.1	4.4	4.5
Percentage of head starts above 4 seconds	57%	21%	45%	46%	42%

Table 9 - Control Group's head start
Source: the author.

The average number of head starts was 48 (range 44-48), and the average length was 4.5 seconds (range 4.1-5.2). This length is within the acceptable value (2-5 seconds) proposed by Lee (2002), but all participants had occurrences below (0.5-

1.5) and above this range (6.1-13.4). In addition, on average 42% of all head starts lasted longer than 4 seconds (range 21-57%), a high percentage which might be indicative that the participants in this group—except for SOT2, to a certain extent—were at odds over finding strategies to avoid leaving the listener in complete silence.

Table 10 provides the results for *pause*.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of pauses	65	39	50	33	47
Shortest pause (in seconds)	0.3	0.3	0.3	0.3	0.3
Longest pause (in seconds)	9.1	5.0	2.6	4.1	5.2
Average pause length (in seconds)	2	2.8	1.5	1.8	2
Pauses longer than 3 seconds	3%	10%	0%	3%	4%

Table 10 - Control Group's pauses
Source: the author.

The average number of pauses was 47, with SOT4 presenting the lowest number (33) and SOT1 presenting the highest number (65). The average pause length (2 seconds) was shorter than the maximum value of 3 seconds proposed by Pio (2003), but all participants except for SOT3 had pauses longer than that (average 5.2). The average value found for the shortest pauses was 0.3 seconds.

According to Schilperoord (1996), long pauses indicate a more effortful cognitive process, that is, the translator/interpreter is searching for planning strategies to solve a problem. On average 4% of all pause time spent by students in the CG lasted longer than 3 seconds (range 0-10%), which is a surprising, yet contradictory, result. It is surprising because the students in this group had not acquired domain knowledge of simultaneous interpreting yet, and therefore, they were not expected to know strategies to avoid complete silence, especially considering that only SOT2 was above the mean (10%). It is contradictory because the results for head start showed that they had long moments of silence before starting to interpret a sentence. Therefore, it seems that the participants did not tend to interrupt segments with pauses, but they did wait a long period before starting the interpreting of a new segment.

Table 11 reports the results for *meaning error*: the CG committed, on average, 6 meaning errors (range 5-8). Such errors seem to be related to lack of domain knowledge. All students in the group used “translation” instead of

“interpreting,” “translate” instead of “interpret,” and “types” instead of “modes” when talking about the differences between consecutive and simultaneous interpreting.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of meaning errors	6	5	8	6	6

Table 11 - Control Group's meaning errors
Source: the author.

Table 12 presents the results for *logical-time sequence error*. The CG made, on average, 31 logical-time sequence errors of different categories, with some segments featuring more than two categories at once.

Variable	SOT1	SOT2	SOT3	SOT4	Average
Total number of logical-time sequence errors	27	28	37	33	31
Changes to the time sequence of the source speech	22%	29%	11%	21%	21%
Changes to the message of the source speech	48%	75%	54%	67%	61%
Break of logical relations between sentences (with the one before, the one after, or both)	30%	25%	19%	12%	21%
Break of logical relations within a sentence	37%	29%	30%	45%	35%
Incompliance with the speaker's communicative intentions	0%	14%	8%	15%	9%

Table 12 - Control Group's logical-time sequence errors
Source: the author.

On average, 9% of the errors involved incompliance with the speaker's communicative intentions, which usually changed how the target audience could understand the source speech. For example, SOT4 rendered, “como eu disse é… é muito criativo e excitante, tem muita adrenalina” [“as I said, it is... it is very creative and exciting, there is a lot of adrenaline”] in her interpreting of “probably the best thing about interpreting is what I just said, it’s exciting, it’s creative, there’s lots of adrenaline, lots of enjoyable pressure on you.” This happened right after a long head start (and omission of a complete sentence).

On average, 21% of the errors changed the time sequence presented by the source speech. For example, SOT2 said, “você vai falar o que… uma história de uma forma diferente” [“you will say what… a story in a different way”] as a rendition for “you might find yourself telling their story or making their argument in a completely different way.” This rendition neglected the uncertainty realized by the modal verb “might.”

On average, 21% of the errors broke the logical relations between sentences (with the one before, the one after, or both), thereby causing discontinuities in the target speech. For example, SOT4 said, “ótimo para reuniões e conferências” [“great for meetings and conferences”] as his rendition for “that means, of course, it’s very good for meetings, conferences.” This rendition was not connected with the sentence before it, it is incomplete—there is no subject nor verb before it (i.e., what is great?).

On average, 35% of the errors entailed breaking the logical relations within a sentence and generated sentences without fluency which were difficult to understand. For example, SOT1 said, “e o intérprete vai anotar e depois…” [“and the interpreter will write down and then…”] as his rendition for “the speaker speaks for a few minutes and the interpreter takes notes.” There is a discontinuity within the sentence because the verb “anotar” [write down] requires a complement in Portuguese that was not expressed by the participant.

On average, 61% of the errors implied changes to the source speech messages. For example, SOT2 said, “as reuniões não são dentro da sua casa” [“the meetings are not in your home”] in his interpreting of “meetings don’t take place outside your house.” The idea conveyed by the interpreter was opposite to that uttered by the speaker. The source speech was figurative, but the interpreter re-expressed it in a way denotatively by referring to an actual house.

4.2.3 Comparison between Experimental Group and Control Group

Table 13 presents a comparison between EG’s and CG’s average results for *omission*.

Variable	EG average	CG average
Total number of omissions	22	25
Omission of source speech words that impaired sentence comprehension	3%	1%
Omission of source speech sentence parts that impaired comprehension of the entire segment	11%	1%
Omission of complete sentences impaired the comprehension of the entire segment	36%	28%
Restructuring of sentences using fewer words	50%	62%
Restructuring of sentences using different words (but not necessarily fewer words)	0%	8%

Table 13 - Comparison between experimental and control groups' data about omission
Source: the author.

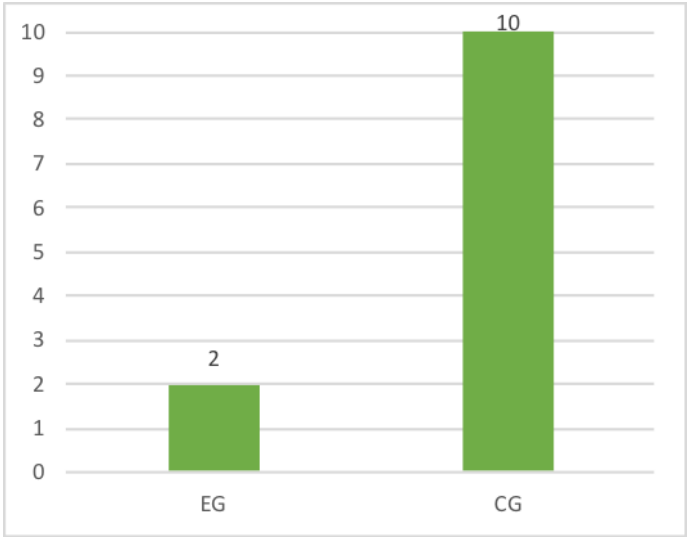
The average number of omissions was similar in both groups: 22 (EG) and 25 (CG). Both groups presented, on average, low percentage of omissions of source speech words that impaired sentence comprehension: 3% in the EG, and 1% in the CG. Low average figures were also found for omission of source speech sentence parts that impaired comprehension of the entire segment, but the percentages were higher in the EG than in the CG (11% vs. 1%). No occurrences were found for restructuring of sentences using different words (but not necessarily fewer words) in the EG, but this type of omission was 8% of the cases in the CG. Most of these restructuring of sentences happened alongside other cognitive effort markers, such as logical-time sequence errors, causing, consequently, difficulties in the comprehension of the target speech.

These three types of omissions may influence target speech comprehension of small chunks of information, since they do not change large text segments. They can, sometimes, help the interpreter avoid cognitive overload by eliminating the reverbalization of small parts of the source speech, but they can also compromise this reverbalization due to unsuccessful restructuring. They represented 14% of all EG's omissions and 10% of all CG's omissions.

The other two categories refer to omissions of larger parts of the source speech. One of them, omission of complete sentences that impaired comprehension of the entire segment, represented, on average, 36% of all omissions in the EG, and 28% of all omissions in the CG. The occurrences in this category can be considered errors, since they impaired the target speech's comprehension and, in some cases, caused other types of errors. These data reveal domain knowledge of simultaneous interpreting did not help students from the EG avoid omission as an error, being EG's figures even higher than CG's.

The last omission category is restructuring of sentences using less words. It accounted for 50% of all omissions in the EG and 62% in the CG. Most of this type of omissions, cannot be considered a strategy, because they caused discontinuities (changed the logical relation between segments, caused lack of logical sense, or altered the segments' time sequence) and changed the source speech message. These data also seem to indicate that the lack of domain knowledge of simultaneous interpreting, especially the lack of procedural knowledge, may have had a negative impact on the performances of students in both groups.

Graph 17 presents a comparison between EG's and CG's average figures for *addition*. While the EG made two additions on average, CG made an average of ten additions. In other words, students in the EG did not use addition as a strategy to solve problems, but students of CG did. The latter's additions probably were an unintentional cognitive solution, since the students from this group had no training in interpreting. Besides, a qualitative analysis of the CG's additions showed they were poor solutions, which entailed further errors. For example, SOT1 added, "pelo telefone" [on the phone] to the source speech segment "you're perhaps working 'round a farm, or you're meeting in a small room somewhere." The entire segment produced by the interpreter was "quando você tá numa reunião pequena ou pelo telefone" ["when you're in a small meeting or on the phone"]. The interpreter omitted "working 'round a farm" but mistakenly added information that was not provided by the speakers' source speech.



Graph 17 – Comparison between EG's and CG's average additions
Source: the author.

Table 14 presents a comparison between EG's and CG' average results for *head start*. The average number of head start was 51 in the EG and 48 in the CG. The slight difference between the groups are related to the number of omissions, since sentences that were completely omitted were not counted as head starts.

The average length of head start was 3.4 seconds in the EG and 4.5 seconds in the CG. The values of both groups were within the acceptable range (2-5 seconds) proposed by Lee (2002), but both groups had head starts below and above this range.

Variable	EG average	CG average
Total number of head starts	51	48
Shortest head start (in seconds)	0.9	1.1
Longest head start (in seconds)	7	8.6
Average head start length (in seconds)	3.4	4.5
Percentage of head starts above 4 seconds	19%	42%

Table 14 - Comparison between EG's and CG's average head start
Source: the author.

The shortest head start was similar in both groups: 0.9 seconds in the EG, and 1.1 seconds in the CG. The same holds true for the longest head starts: 7 seconds in the EG, and 8.6 seconds in the CG. Head starts shorter than 2 seconds may cause processing problems further ahead, while a head start longer than 4 seconds may indicate the interpreter could have found a problem which s/he did not know how to solve. The results for the CG may be indicative that the participants in this group did not know interpreting strategies to avoid long periods of silence or to wait at least 2 seconds to begin their renditions. In contrast, the results for the EG are surprising, and may be indicative that the participants did not acquire enough procedural knowledge of simultaneous interpreting.

The largest difference between the groups is in the average percentage of head starts above 4 seconds: 19% of the head start produced by the EG, against 42% in the CG. These data seem to reveal that CG spent more time on cognitive processing than EG, and may suggest domain knowledge had an overall positive effect on EG's performances.

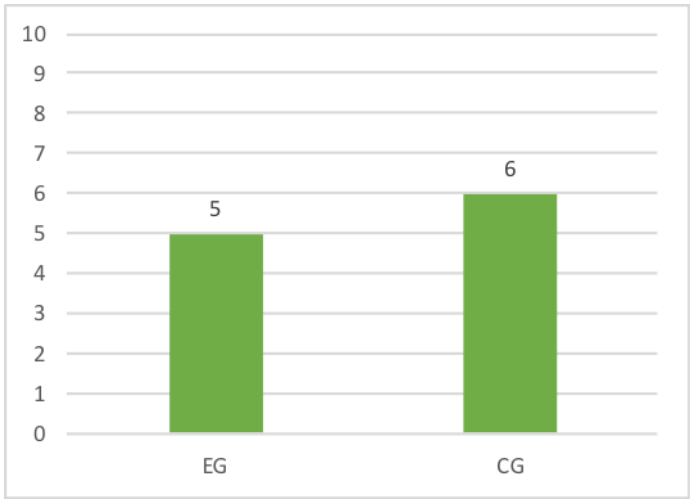
Table 15 presents a comparison between EG's and CG's averages for *pause.* The average number of pauses was 38 in the EG and 47 in the CG. Both figures are higher than the number found in the source speech (34). Therefore, some of the interpreters' pauses may indicate effortful processing of a difficult segment.

Variable	EG average	CG average
Total number of pauses	38	47
Shortest pause (in seconds)	0.4	0.3
Longest pause (in seconds)	5.2	5.2
Average pause length (in seconds)	2.1	2
Pauses longer than 3 seconds	8%	4%

Table 15 - Comparison between EG's and CG's average pauses
Source: the author.

Average pause length was similar in both groups: 2.1 seconds in the EG and 2 seconds in the CG. Both were inside the range value (maximum of 3 seconds) proposed by Pio (2003). Average figures for the shortest pauses were similar: 0.4 seconds in the EG, and 0.3 seconds in the CG. Average figures for the longest pauses were equal in both groups: 5.2 seconds. Finally, the percentage of pauses longer than 3 seconds were also similar: 8% in the EG pauses, and 4% in the CG. This result may indicate that pauses were not the most recurrent strategy used to solve a problem during the cognitive process of both groups.

Graph 18 compares EG's and CG's average figures for *meaning error*.



Graph 18 – Comparison between EG's and CG's meaning errors
Source: the author.

The average number of meaning errors was similar in the EG and in the CG: 5 in the EG, and 6 in the CG. Such errors could have been avoided by interpreters who had domain knowledge of the interpreting session, i.e., students in the EG. However, half of the students in the EG used "translation" instead of "interpreting," "translate" instead of "interpret," and "types" instead of "modes" when talking about the differences between consecutive and simultaneous interpreting, while all students in the CG committed these errors. Such errors may be indicative that some students in the EG did not acquire sufficient domain knowledge of simultaneous interpreting to avoid this type of error, an expected error of students from the CG.

Table 16 provides a comparison between EG's and CG's average figures for *logical-time sequence error*.

Variable	EG average	CG average
Total number of logical-time sequence errors	25	31
Changes to the time sequence of the source speech	19%	21%
Changes to the message of the source speech	48%	61%
Break of logical relations between sentences (with the one before, the one after, or both)	36%	21%
Break of logical relations within a sentence	9%	35%
Incompliance with the speaker's communicative intentions	13%	9%

Table 16 - Comparison between EG's and CG's logical-time sequence errors
Source: the author.

The average figures of logical-time sequence errors were similar in both groups: 25 in the EG, and 31 in the CG. The target speech percentage of errors that changed the time sequence in the source speech was similar in both groups: 19% in the EG, and 21% in the CG. For example, SWT1 said, "você trabalha pela Europa, ou pelo mundo" ["you work around Europe or around the world"] as his rendition for "you might find yourself travelling all around Europe or all around the world". Another example is SOT2's rendition, "você vai falar o que, uma história de uma forma diferente" [you will speak what, a story in a different way"], for "you might find yourself telling their story or making their argument in a completely different way". In both segments there is a modal verb ("might") that expresses the idea of possibility. However, they were both interpreted, by different interpreters, as expressing the idea of certainty, due to the changes made by them to the verbal aspect.

Similar results in both groups were also found for errors showing incompliance with the speaker's communicative intentions: 13% in the EG, and 9% in the CG. In most times, such errors changed how the target audience can understand the source speech and reflected problems related to the target language idiomaticity. For example, SWT4 said, "você não usa as mesmas palavras para fazer o mesmo argumento" [you don't use the same words to make the same argument] as her rendition for "using different sentences and different words to make the same point". Another example is SOT2's rendition, "em frases diferentes, com palavras diferentes pra chegar ao mesmo ponto" ["in different sentences, with different word to reach the same point"] in her interpreting of "using different sentences and different words to make the same point." The participants were too "literal" (i.e., they tried to use the same words, exactly, used by the speaker), in such cases and did not think of how the target audience would understand, or receive, the text delivered.

In 36% of the EG errors, and in 21% of CG errors, the participant broke the logical relations between sentences, thereby causing discontinuities in the target speech. These errors generated sentences without fluency which were difficult to understand. For example, SWT2 said, “Você pode se encontrar em, em algumas situações culturais. Os... Você teve que... Você tem que falar algumas coisas culturais” [“You can find youserfl in, in some cultural situations. The… You have to… You have to speak some cultural stuff”] in her interpreting of “You might also sometimes find yourself adding some cultural information. The speaker might say something which everyone understands in their culture, but for your listeners to understand, you might quickly have to add a couple of cultural points.” Another example of this nature is SOT2’s, “Então, qual tipo de pessoa gostaria de ser um intérprete. É... Muitas coisas acontecem que... O estresse” [So, what kind of person would like to be an interpreter… Mmm… Much stuff happens that… The stress”] as her rendition for “So, what kind of person wants to be an interpreter. Well, it’s people who like the stress, the excitement in interpreting.” Both samples point to no connections between the sentences, and the listeners of the target audience would probably be at odds over understanding the speaker’s idea.

This was an unexpected result for participants in the EG, since they had received theoretical and practical training and should know what strategies they could use to avoid creating this type of discontinuity in the target speech. However, this was an expected result for CG because in several segments the students omitted a whole sentence, even compromising the text comprehension in some of these segments, instead of producing an unfinished sentence.

The figures for errors breaking the logical relations within a sentence were different in the two groups: 9% in the EG, and 35% in the CG. For example, SWT2 said, “porque a tradução você tem tempo p’ra [sic] fazer” [“because translation you have time to do”] in her rendition for “as translator you have time to look up the vocabulary.” Another example is SOT1’s rendition, “às vezes você vai tá [sic] contando uma história de uma história” [“sometimes you will be telling the story of a story”] as his interpreting of “you might find yourself telling their story or making their argument in a completely different way.”

This finding seems to indicate that students in the EG knew how to establish a logical sequence within a sentence but had trouble in doing the same across sentences. The opposite happened with students in the CG, i.e., they had more

trouble in establishing a logical sequence between different sentences. This result seems to corroborate that domain knowledge, more specifically procedural knowledge, helped students in the EG produce a more fluent speech, easier to understand, than the speech produced by students in the CG.

Finally, the percentage of segments which changed the message of the source speech was high in both groups (48% for EG, and 61% for CG), but higher on CG. For example, SWT2 said, “os tradutores são pessoas muito precisas, muito cuidadosas” [“the translators are very accurate, very careful people] as her interpreting of “translation appeals to people who are thorough, who like to be careful.” The source speech message was that translation attracts people who enjoy being thorough and careful, rather than such characteristics are present in all translators. Another example is SOT4’s rendition, “pode ser ótimo para uma reunião fechada, por exemplo” [“it can be great for a closed meeting”] as her interpreting of “you’re perhaps working ‘round a farm or you’re just meeting in a small room somewhere.” Once again, the findings were as expected for the CG, but not for the EG, who might not have mastered enough domain knowledge of interpreting to perform an interpreting task that did not change the source message.

Chapter 5 provides the final remarks, including the limitations of this study and suggestions for further research.

5 FINAL REMARKS

The general objective of this senior thesis is to analyze the role that domain knowledge—as both declarative knowledge and procedural knowledge—plays on the performance and understanding of simultaneous interpreting tasks. Two specific objectives were established to accomplish this, namely:

1. To assess whether students' beliefs about simultaneous interpreting change after they acquire theoretical and practical training to perform simultaneous interpreting tasks; and
2. To assess whether domain knowledge has an impact on the cognitive effort of translation students during a simultaneous interpreting session, by analyzing their (a) omissions, (b) additions, (c) head starts, (d) pauses, (e) meaning errors and (f) logical-time sequence errors.

The initial hypotheses were that

3) There are differences between the beliefs about simultaneous interpreting held by students before and after receiving theoretical and practical training in simultaneous interpreting; and
4) Domain knowledge acquired through formal training has a positive impact in decreasing the cognitive effort of translation students during a simultaneous interpreting session.

The first hypothesis was based on Pagano's (2000) argument that beliefs are related to each subject's experience and cultural environment. They can change due to the accumulation of experiences or through a deliberate intervention on an individual's learning process by an external agent.

The second hypothesis was based on Pio (2003), Ericsson (2000) and Liu, Scharllert and Carroll (2004). The latter authors stated that "professional interpreters were able to interpret more of the source language input accurately than student interpreters" (LIU; SCHARLLERT; CARROLL, 2004, p. 35). Although this investigation does not address professional interpreters, nor experts, the group of participants (EG and CG) had differences related to experience and training, as explained below.

The first hypothesis was partially confirmed. The answers to the questionnaires by participants in the EG seem to indicate that some beliefs changed,

while others did not. It seems that 24 hours of simultaneous interpreting as engaged by the participants are not enough to completely change the students' beliefs. Nonetheless, it is surprising that students in the fourth or in the sixth semester of an undergraduate program in Translation still believe that to be a good interpreter someone must have a special gift. This seems to indicate much more needs to be done, during the program, to change students' conceptions about translation/interpreting (more courses about interpreting, for instance).

The findings show that students changed their opinions regarding the role of interpreter's training. Before the classes about simultaneous interpreting, students believed that formal courses about this interpreting mode provided only theoretical knowledge. After the classes, they stated they believed that these courses are focused on professional training, rather than on theory only.

Other belief that seems to have changed was about the importance of domain knowledge to the interpreters' performances. Students had already stated they believed it was true on the first questionnaire, but the percentage of agreement was higher in the second one. It indicates that they understood the importance of preparing themselves before an interpreting session through the study of content related to the session topic. An unexpected, albeit positive, result was that even the fourth semester students already believed that preparation plays an important role in the interpreters' performances.

It is worth pointing out that there are not right or wrong answers about students' beliefs. Following Esqueda and Oliveira (2013), the aim of applying questionnaires was to identify the beliefs and think of the impacts they may have over the translators' training process.

The present findings reinforce what Esqueda and Oliveira (2013), Rodrigues (2004) and Pagano (2000) contend, that is, training plays an important role in changing students' beliefs, and consequently, in changing how they will act as professional interpreters after graduating. The results meet Pagano's assertion that

> instruction makes the student aware of the theoretical factors and principles on which a successful translation rests. It also makes the apprentice deepen his/her linguistic knowledge, especially about discursive aspects related to the entire text, with a specific function within a certain culture. Besides, instruction leads the translator to make well-grounded decisions, and it helps him/her develop a professional attitude.[20] (PAGANO, 2000, p. 27)

[20] My translation to: "A instrução torna o aluno consciente dos fatores e princípios teóricos em que se apóia uma tradução bem-sucedida. Também leva o aprendiz a aprofundar seus

Other specific objective of this study was to assess whether domain knowledge has an influence on the cognitive effort made by students during a simultaneous interpreting session. To reach this objective, the participants were asked to complete two tasks: to answer a questionnaire (addressing their declarative knowledge of simultaneous interpreting), and to perform a simultaneous interpreting session (targeting their procedural knowledge of simultaneous interpreting). The data obtained through these instruments can be compared to increase the reliability and validity of the results (HALE; NAPIER, 2013).

The initial hypotheses that cognitive effort made by students during a simultaneous interpreting session when they have not had any theoretical and practical training to do so is different from that made by students who have was partially confirmed. The performance in the EG, after acquiring domain knowledge, was better as to fluency and meaning than the performance in the CG. However, it was not a performance expected from students nearly finishing an undergraduate program in Translation. This seems to indicate that the training in simultaneous interpreting in the said program is positive as a first contact with the field, but it is insufficient for one to adequately perform as a simultaneous interpreter. Hours of practice are fundamental to any interpreter who wishes to excel in the field.

Students' declarative knowledge of simultaneous interpreting was identified through the questionnaires. The results showed that students' beliefs about simultaneous interpreting changed after they had acquired some domain knowledge of this topic. They also revealed they believe linguistic and domain knowledge of the session theme influence the quality of interpreters' performance. Most of them also agreed to the idea that domain knowledge of simultaneous interpreting could help interpreters solve interpreting problems.

Before moving on to the results from students' procedural knowledge, identified through recordings of interpreting tasks performed by them, it is worth to emphasize that "quality cannot be assessed in absolute terms: it has to be handled from many different angles, not only the communicative event, naturally, but also its fidelity to the information in the source speech and its value as a speech of its own" (TISELIUS; JENSET, 2011, p. 273). Markers of cognitive effort (i.e., omission,

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conhecimentos lingüísticos, sobretudo em relação aos aspectos discursivos que dizem respeito ao texto como um todo, com uma função específica dentro de uma cultura determinada. A instrução promove, ainda, a tomada de decisões mais bem fundamentadas do tradutor e o ajuda a desenvolver uma atitude mais profissional" (PAGANO, 2000, p. 27).

addition, head start, pause, meaning error, and logical-time sequence error) were searched through the entire speech of each participant to identify possible instances of effortful cognitive processing. According to Gile (1999, p. 159), if “only a few fail to render them [relevant segments] correctly in the target language, this would tend to […] strengthen the hypothesis that processing capacity deficits are involved.” In this study, students from the same group had similar problems in processing the same segments, which may be interpreted as an indication that domain knowledge had an influence on the interpreters’ productions.

The findings also revealed that students from the EG were better at prioritizing the more important idea units over the less important ones. Considering the omissions and logical-time sequence errors, the EG performed texts more easily understandable to the target audience than the CG. This performance closer to that described by Liu, Scharllert and Carroll (2004), according to professional interpreters separate better essential from secondary idea units than students. This study did not deal with professional interpreters, but those students who had more domain knowledge of simultaneous interpreting could perform this separation better than students who did not.

In addition, the EG presented less overlapping of markers of cognitive effort than the CG. The EG knew how to establish logical sequences within sentences, but had trouble in doing the same across sentences. The group with higher domain knowledge was the one who enunciated more sentences from their beginnings. The opposite happened with the CG. All these findings seem to show that domain knowledge, more specifically procedural knowledge, helped the EG produce a more fluent and intelligible speech than the CG.

Nevertheless, the EG also delivered problematic segments, with several occurrences of meaning errors, which were not expected from them (e.g., uttering “translation types” instead of “translation modes” when differentiating consecutive from simultaneous interpreting). Students in the EG did not have enough domain knowledge of interpreting to perform an interpreting task that did not alter the message delivered by the speaker. Another indication of this phenomenon is the high percentage of head starts longer than 4 seconds in the EG. Also, students in the EG did not wait 2 seconds to begin uttering their sentences, another interpreting strategy that they did not use. There were also several occurrences of discontinuities (unfinished sentences) throughout the target speech. All this evidence seems to

indicate the EG students did not have enough procedural knowledge of interpreting strategies. They tried to use some of them, like omissions and shorter moments of silence (pauses and head starts), but this caused errors in several moments.

Students within the same group had distinct performances, i.e., the groups were not homogeneous. Data seemed to point out that SWT3 and SOT2 delivered with more quality than their counterparts in their respective groups. The products delivered by them were more fluent and intelligible.

As a conclusion, EG students' declarative knowledge and procedural knowledge seems to have improved with training. However, the knowledge acquired was insufficient to help them find interpreting strategies to avoid a high level of cognitive effort, which ended up with several errors and problematic target segments.

However, as this is an exploratory study, the present results cannot be generalized. They can only indicate directions for future research and awaken the interest of other researchers in this field.

Another limitation of this study is regarding the analysis of interpreting strategies and the methods used to measure cognitive effort. Li (2013) points out that the literature presents several strategies, which are sometimes unclear: Different authors speak of the same strategy but using different terms and different reference values. Regarding the methods used to measure the markers, they are susceptible to mistakes made by the researcher, especially when it comes to pauses and head starts, which could have been measured in milliseconds, and the classification of data, which were prone to subjective interpretation.

Future research could explore data found in this research related to influence of domain knowledge over anticipation and the overlapping of different markers of cognitive effort, which were briefly described without any data in this thesis. Future research could also address the impact of domain knowledge on markers of cognitive effort regarding fluency, such as filled pauses, hesitations, repetitions and false starts. Another suggestion is a fine-grained analysis of the output and an analysis of phonological measures (e.g., intonation, prosody).

This study may contribute to training and professional performance of future simultaneous interpreters. It empirically sets out to show interpreters should have not only linguistic knowledge, but also domain knowledge (declarative and procedural) to deliver a fluent, intelligible target speech. Thus, interpreters should seek constant improvement, since new knowledge may change their beliefs about their work and,

consequently, may help them find better interpreting strategies, make better deliveries and make less cognitive effort during a working session.

Finally, this study represents a small contribution to the translation process research field, since it explores cognitive processes involved in simultaneous interpreting tasks, something unexplored to date.

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APPENDICES

Appendix 1: Questionnaire in Portuguese

1. Código do participante: _____

2. Idade: _____

3. Sexo: _____

4. Qual sua língua materna? _____

5. Quantas línguas você domina além da sua língua materna? Quais são elas? _____

6. Classifique o seu nível de proficiência em cada uma das línguas que você domina além da sua língua materna. Caso domine mais de 3 línguas, indique seu nível de proficiência da quarta língua em diante no espaço disponível ao final desse questionário.

Idioma 1: _____

Lê	( ) Pouco	( ) Razoavelmente	( ) Bem
Fala	( ) Pouco	( ) Razoavelmente	( ) Bem
Escreve	( ) Pouco	( ) Razoavelmente	( ) Bem
Compreende	( ) Pouco	( ) Razoavelmente	( ) Bem

Idioma 2: _____

Lê	( ) Pouco	( ) Razoavelmente	( ) Bem
Fala	( ) Pouco	( ) Razoavelmente	( ) Bem
Escreve	( ) Pouco	( ) Razoavelmente	( ) Bem
Compreende	( ) Pouco	( ) Razoavelmente	( ) Bem

Idioma 3: _____

Lê	( ) Pouco	( ) Razoavelmente	( ) Bem
Fala	( ) Pouco	( ) Razoavelmente	( ) Bem
Escreve	( ) Pouco	( ) Razoavelmente	( ) Bem
Compreende	( ) Pouco	( ) Razoavelmente	( ) Bem

7. Há quantos anos você estuda inglês? _____

8. Como você estudou inglês (em alguma instituição, sozinho etc.)? _____

9. Você já morou fora do Brasil? _____
   Se sim, por quanto tempo? _____
   Onde? _____
   Com qual propósito? _____

10. Você tem experiência em atuar como intérprete? _____

11. Se você respondeu “sim” para a pergunta anterior, quais modalidades de interpretação você já realizou? Quais as línguas de partida e de chegada? Que tipo de eventos você interpreta (ou interpretou) com mais frequência? _____

12. Se você respondeu “sim” para a pergunta 10, você tem dificuldade(s) para interpretar simultaneamente de uma língua estrangeira para a sua língua materna? E de sua língua materna para a língua estrangeira? Se sim, qual(is)? _____

13. Você já frequentou algum curso profissionalizante na área de interpretação simultânea? Se sim, qual? _____

14. Você já assistiu a alguma palestra ou participou de algum evento sobre interpretação simultânea? Se sim, qual(is)? _____

15. Você acha que a sua experiência, ou ausência de experiência, nesses cursos ou eventos pode influenciar a sua atuação como intérprete simultâneo? _____

16. Qual papel você acha que esses cursos ou eventos desempenham na formação de um intérprete simultâneo? _____

17. Marque um X na coluna que indique o seu nível de concordância para as seguintes afirmações:

	Discordo totalmente	Discordo parcialmente	Não concordo nem discordo	Concordo parcialmente	Concordo totalmente
a) O bom intérprete simultâneo é aquele que possui um dom especial para realizar essa atividade.					
b) O bom intérprete simultâneo é aquele que domina as duas línguas de trabalho (materna e estrangeira).					
c) O bom intérprete simultâneo é aquele que já morou em algum país falante da língua estrangeira utilizada na interpretação.					
d) O bom intérprete simultâneo é aquele que possui conhecimento linguístico tanto da língua materna quanto da estrangeira.					
e) O bom intérprete simultâneo é aquele que se preocupa em reproduzir exatamente a fala do palestrante.					
f) O bom intérprete simultâneo é aquele que se preocupa em fazer com que o ouvinte compreenda o que está sendo falado na palestra.					
g) O bom intérprete simultâneo conhece teorias e estratégias de interpretação para realizar uma interpretação de qualidade.					
h) O bom intérprete simultâneo deve se preparar antes de realizar uma interpretação, fazendo pesquisas sobre o assunto da palestra.					

	Discordo totalmente	Discordo parcialmente	Não concordo nem discordo	Concordo parcialmente	Concordo totalmente
i) O bom intérprete simultâneo deve conhecer bem o assunto da palestra para poder realizar uma interpretação.					
j) O intérprete simultâneo que conhece bem o assunto da palestra que irá interpretar utiliza melhores estratégias de interpretação.					
k) O intérprete simultâneo que conhece bem o assunto de uma palestra tem maior facilidade em resolver problemas de interpretação do que aquele que não sabe nada sobre o assunto.					
l) Um médico cardiologista que domina uma língua estrangeira terá maior facilidade em interpretar simultaneamente uma conferência sobre cardiologia do que um intérprete.					
m) A qualidade da interpretação simultânea de uma conferência sobre cardiologia realizada por um médico cardiologista que domina a língua estrangeira será maior do que a qualidade da interpretação realizada por um intérprete.					

Se desejar, utilize o espaço abaixo para justificar suas respostas. _____

Appendix 2: Questionnaire translated into English

1. Participant's code: _____

2. Age: _____

3. Sex: _____

4. Which is your mother tongue? _____

5. How many languages do you master? Which ones?_____

6. Classify your level of proficiency in each of the languages you master apart from your mother tongue. If you master more than three languages, indicate your level of proficiency on the fourth language in the space available at the end of this questionnaire.

Language 1:_____			
Read	( ) Poorly	( ) Reasonably	( ) Well
Speak	( ) Poorly	( ) Reasonably	( ) Well
Write	( ) Poorly	( ) Reasonably	( ) Well
Understand	( ) Poorly	( ) Reasonably	( ) Well
Language 2:_____			
Read	( ) Poorly	( ) Reasonably	( ) Well
Speak	( ) Poorly	( ) Reasonably	( ) Well
Write	( ) Poorly	( ) Reasonably	( ) Well
Understand	( ) Poorly	( ) Reasonably	( ) Well
Language 3:_____			
Read	( ) Poorly	( ) Reasonably	( ) Well
Speak	( ) Poorly	( ) Reasonably	( ) Well
Write	( ) Poorly	( ) Reasonably	( ) Well
Understand	( ) Poorly	( ) Reasonably	( ) Well

7. How long have you been studying English?_____

8. How did you study English (at a language school, by yourself etc.)? _____

9. Have you ever lived abroad?_____
   If yes, how long?_____
   Where?_____
   What was the purpose? _____

10. Do you have experience in working as an interpreter? _____

11. If you answered "yes" to the previous question, which interpreting modes did you perform? Which were the source and the target languages? What types of events do you (or did you) interpret more frequently?_____

12. If you answered "yes" to question number 10, do you have trouble interpreting simultaneously from a foreign language into your mother tongue? And from mother tongue into a foreign language? If "yes", which one(s)? _____

13. Have you ever taken part in a professional course in simultaneous interpreting? If yes, which one? _____

14. Have you ever watched a speech or have you ever joined in an event about simultaneous interpreting? If "yes", which one(s)? _____

15. Do you think your experience, or lack of experience, in such courses or events may influence your performance as a simultaneous interpreter? _____

16. What role do you think such courses or events represent to a simultaneous interpreter training?_____

17. Check an X in the column that indicates your level of agreement with the following sentences:

	Completely disagree	Partially disagree	Neither agree nor disagree	Partially agree	Completely agree
a) A good simultaneous interpreter is someone who has a special gift to perform this task.					
b) A good simultaneous interpreter is someone who masters both the mother tongue and the foreign language with which s/he is working.					
c) A good simultaneous interpreter is someone who has lived in a country that speaks the foreign language involved in the interpreting task.					
d) A good simultaneous interpreter is someone who has linguistic knowledge of both the mother tongue and the foreign language					
e) A good simultaneous interpreter is someone concerned about reproducing exactly what the speaker is saying					
f) A good simultaneous interpreter is someone concerned with making the listener understand what is being said in the speech					
g) A good simultaneous interpreter is someone who knows interpreting theories and strategies to perform with quality					
h) A good simultaneous interpreter should prepare herself/himself to interpret by researching about the topic of the speech					
i) A good simultaneous interpreter must have good knowledge of the speech's theme to perform adequately					
j) The simultaneous interpreter who has good knowledge of the speech's theme resorts to fewer interpreting strategies					
k) The simultaneous interpreter who has good knowledge of the speech's theme solves interpreting problems more easily than the one who does not know anything about the theme.					
l) A cardiologist who masters a foreign language will perform the simultaneous interpreting of a conference about Cardiology more easily than an interpreter					
m) The quality of the simultaneous interpreting of a conference about Cardiology performed by a cardiologist who masters the foreign language will be superior to that performed by an interpreter					

Use the space below to leave further comments, if any. _____