

RESEARCH ARTICLE

Using Stimulated Recall to Probe Note-taking and Note-related Difficulties Perceived by Professional Trainee Interpreters

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Abstract:

This study is an attempt to explore note-taking and note-related difficulties perceived by six professional trainee interpreters (PTIs) during a Chinese-English consecutive interpreting task and the possible causes behind them. It deployed "stimulated recall" (SR) and an immediate post-SR interview to elicit and collect data from the PTIs. Analysis of the two differing yet cross-checking data sets reveals that the difficulties perceived by the participants are: 1) trainee-related difficulty: their partial or complete failure to recall the source information (SI) because of the deficit in memory capacity and the subsequent failure to jot down notes; 2) context-related difficulty: inability to re-identify the notes from whose cues to retrieve the encoded SI for delivery; and 3) task-related difficulty: improper ways of note-taking. Further analysis of the same data sets indicates that the difficulties with note-taking and note-related interpreting activities are largely occasioned by cognitive and non-cognitive factors. The cognitive factors include the participants' limited working memory capacity and ineptness in managing the distribution of restricted cognitive resources between listening and writing whereas the genre-specific linguistic structures of the SI, the densely embedded propositions within the task materials, the hidden inter-sentence links and the participants' unfamiliarity with the subject matter and maladjustment to the genre constitute the non-cognitive factors. The findings of this study provides insights for interpreting training.

Keywords: stimulated recall, immediate post-stimulated-recall interview, note-taking and note-related interpreting, professional trainee interpreters, perceived difficulties, underlying causes



1. Introduction

Note-taking has long been considered as a high-stake component in consecutive interpreting (CI). It requires the interpreter to comprehend the source message first, prior to (re-) formulating and (re-) organizing the message to be delivered in the target language. In so doing, a considerable host of utterances will get lost from the interpreter's memory within fractions of a second and superseded by other incoming chunks of source information (SI) (Gile, 1997; Chen, 2020; Hu, 2008; Kuang & Zheng, 2022) if the interpreter cannot resort to the notes that are taken in the form of tokens, characters, figures etc. for the most essential parts of the SI. In other words, whether or not a CI task can be successfully accomplished hinges to a great extent upon the interpreter's ability to retain the SI in working memory (Awh et al., 2006; Gazzaley & Nobre, 2012). Hence, how an interpreter manages skillful control over the messages to be selected, encoded and retained in working memory and how they will use notes already taken to assist them in activating, retrieving and delivering the information with precision and fluency have been the focus of CI studies. Consequently, it is of great necessity to clarify, first and foremost, what type(s) of difficulties the trainee interpreters per se actually perceive before any feasible solutions can be proposed to note-taking difficulties, or, for this matter, any efficacious instruction method might be suggested for classroom training to improve working memory capacity in particular and interpreting competence in general. Put another way, as educators, prior to administering the "right doses of teaching or instruction remedies", we need to understand clearly and precisely the insiders' own perspective, not the outsiders' and the researchers' inference or assumption on this score (Carless, 2006), which is key to addressing the issues with note-taking and note-related activities in CI. The present study is conducted for this reason.

2. Previous Studies on Difficulties with Note-taking and Note-related Activities in Consecutive Interpreting

As previously mentioned, the reason why research on consecutive note-taking and note-related activities has been done may reside in the fact that it enables interpreting teacher and trainer alike to discern the interpreters' competence manifested at different interpreting stages such as processing, comprehending, and reformulating the SI because CI notes cannot be word-to-word recording of the codes already heard. Such reason may also motivate researchers to further investigate the interplay between the form, language, quantity of notes and interpreting quality (Dam, 2004; Dam et al., 2005; Gao, 2019; Hu, 2008; Ilg & Lambert, 1996; Lambert, 1988; Lung, 1999). However, the question why there is such an interplay, if any, has seldom been raised. Further, very few studies (e.g. Kuang & Zheng, 2022) have been made that employ direct and straightforward methods to explore the likely difficulties which consecutive interpreters encounter in real-time interpreting and the underlying causes thereof.

2.1 Clarifying the term 'difficulty' and classifying note-taking and note-related interpreting difficulties

According to Housen & Simoens (2016: 164), "key to understanding how a second language is learned is understanding the difficulties that are associated with it." They held that such terms as "difficult", "cognitively complex", "complex", "hard", "problematic", "challenging" (p. 165) should be defined clearly with operational criteria and, in this way, L2 learning pitfalls could be scientifically



identified and effectively overcome. We maintain that this mode of thinking befits the case of researching on the challenges of note-taking and note-related interpreting activities. More to the point, their taxonomy of L2 learning difficulty (Housen & Simoens, 2016:164) deepens our understanding of note-taking and note-related interpreting difficulties and is most applicable to our analysis. To be specific, inspired by their way of taxonomizing L2 learning difficulty, we could similarly separate note-taking and note-related challenges into three types, respectively: interpreting task-related difficulty (which focuses on intrinsic features or properties of the task at hand); individual trainee-related difficulty (which emphasizes interpreters' common and idiosyncratic characteristics and interpreting styles); and training context-related difficulty (which concentrates on what kinds of training trainee interpreters have been exposed to and what sorts of skills they have already grasped). Such a broad classification will clarify the ground where various types of pitfalls reside, both with note-taking behavior and with subsequent note-related interpreting activities. For example, the note-taking difficulty might be caused by the interpreting task proper - the task span could be too long for the interpreter to concentrate on, or the SI could be so rich in propositions with its genre being so alien to the interpreter that they cannot adjust appropriately to the demands of the task at hand. These intrinsic features of the task will present interpreters with note-taking difficulty of varying degrees. In the case of trainee-related difficulty, it is not hard to understand that, if a trainee interpreter lacks adequate drilling and practicing, they cannot quickly adapt to a genre-specific task that entails unfamiliar SI and accomplish it satisfactorily. Where the training context-related difficulty is concerned, some note-taking or note-related difficulties may arise from insufficient awareness of a particular genre on the part of the interpreting teacher/trainer who therefore fail to provide adequate training or instruction in this regard.

Note-taking behavior is divided into three smaller and discrete acts cutting across different stages of interpreting in the present study: the first act of jotting down notes while comprehending the incoming SI; evidently, this is the very act of taking notes alone; the second act of decoding the noted tokens and trying to retrieve the information encoded by them when reformulating the information for subsequent delivery; less evidently, this could be deemed note-related interpreting act (I); and the third act of integrating the essential SI decoded from the noted symbols or tokens and re-conceptualizing for the ongoing interpreting; and this can be regarded as note-related interpreting act (II). Because the three discrete yet consecutive acts take place just within an instant, normally they are not distinct divisions nor heeded by outsiders. By fractionating the broad and blurry 'note-taking' behavior into these three more observable and operational smaller acts, we could put in perspective the difficulties with note-taking and note-related activities and avoid talking about the difficulties too generally and vaguely. To recapitulate, we are going to deal with the difficulties not only in jotting down signs, numbers and the like; in decoding the cued meanings of symbols; but also in integrating the information encoded by the tokens into reconceptualizing and delivering.

2.2 Previous research on note-taking and note-related difficulties

Among the few studies in this dimension stands out the psycholinguistic study of Daro (1997) on Spanish-Danish CI. It indirectly infers the potential causes that might affect the performance of the consecutive interpreters' note-taking. According to her research, between the two tasks of listening and taking notes of SI, although no direct and similar phonetic overlapping phenomenon is encountered as in the activity of simultaneous interpreting, it is reasonable to think that the two cognitive activities of



listening and note-taking, which occur simultaneously, will interrupt the interpreter's memory (Cowan, 1988, 2000). In addition, during listening and writing, the interpreter might meet with some phonetic interference because the sounds already heard retain their inner phonological representations in the brain (Daro, 1997). In other words, there is a trade-off between phonetic overlapping and writing, and in the very process of taking notes of SI, the interpreter is actually executing two highly demanding cognitive tasks at the same time: listening attentively, which recruits stimulus-driven attention (Ravizza & Hazeltine, 2013) to identify, distinguish, comprehend, select and encode the incoming SI represented by strings of sounds, and taking notes, which demands them to distribute attentive resources to jot down symbols or tokens on their notepad. While the note-taking task is being executed, the memory traces of those incoming phonological units might be upset and suppressed by the very act of writing, thus inhibiting the "perceptual loop" (Levelt, 1989) already formed in working memory (Baddeley, 1997; Gathercole & Baddeley, 1993; Baddeley & Logie, 1999; Baddeley, 2003) from being refreshed and retained through sub-vocal rehearsal. The consequence is that the notes taken may be incomplete and the SI retained partially lost. According to Baddeley's memory model (1997; Baddeley, 2003), this kind of "phonetic disturbance" can adversely affect the activity of note-taking (Christoffels et al., 2006).

Given the presence of such trade-off, it is necessary to investigate what kind of cognitive difficulties Chinese trainee interpreters frequently encounter when taking notes during CI; on the other hand, it is also necessary to consider whether non-cognitive factors may also contribute to the difficulties keenly experienced by them, for instance, how different interpreting tasks may affect the interpreters and in what specific aspects. Dai & Xu (2007) explored the note-taking features of PTIs and found that they were sometimes using fuzzy marks to note down the SI. Xu (2010) further examined some PTIs' pauses in CI and found that many pauses were directly related to note-taking and note-related difficulties. These studies provide a further drive to inquire into the specific difficulties involved in their note-taking and note-related activities.

The most recent study of the difficulty with note-taking per se is conducted by Kuang & Zheng (2022) which used Wacom digital pen and Tobii eye-tracker to compare how professional and student interpreters dealt with easy and difficult tasks in video remote interpreting. The findings from this study suggest that if the task difficulty increases, the student interpreters reduce their efforts in taking notes; the time taken between their decision as to whether to note or not and the actual act of taking notes becomes longer; and their visual attention obviously decreases (2022:1). Their professional counterparts just performed in the opposite way. However, they did not fully explore the underlying reasons why the student interpreters behaved in such way.

The present study attempts to address these questions head-on by using stimulated recall (SR) as a straightforward tool to investigate the trainee interpreters' online cognitive processing activities in performing a CI task.

3. Stimulated Recall as an Applicable Method for Interpreting Studies

Stimulated recall (SR) aims at exploring learners' thought processes or strategies and "researchers can prompt them (research participants) to recall and report thoughts they had while performing a task or participating in an event." (Gass & Mackey, 2000, 2007 p.53). The greatest strength of SR as a research instrument resides in that the videotaped footages prompt the participant to introspect what



was really going on in their mind at a particular moment or second while they were engaged in a given task, shortly after the task was completed. Since the videotaped footages capture those meaningful moments, and are replayed immediately, theoretically speaking, it is possible for researchers to probe into the rationale or thought process behind their behavior. In this way, SR can help the researcher to reveal part of the intricacies of the online cognitive state involved in real-time tasks or events (Basturkmen et al., 2004; Ericsson & Simon, 1984). In addition, the unlocked rationale is not the researcher's own conjecture or assumption, thus greatly reducing the degree of subjectivity and increasing the degree of objectivity and enhancing the data's validity.

As for the timing of recalling or introspecting, Vik-Tuovinen (2002) argued that recalling should be made as soon as possible, for a person's memories of different cognitive states at different stages of a given task are, by nature, short-termed. A long lapse of time will blur those shards of memories and even erase the traces of memory and, consequently, it will become impossible to recollect what exactly is going on in the interpreters' mind, even when they are shown the prompt screen scenes. Gass & Mackey (2000; 2007) echoed the same caution and proposed four caveats as to how to guarantee the effective use of SR: 1) data should be collected as soon as possible after the event that is the focus of the recall; 2) the stimulus should be as strong as possible to activate memory structures; 3) the participants should be minimally trained; that is, they should be able to carry out the procedure, but should not be cued into any particular aspect of the event; and 4) the amount of the structure involved in the recall procedure should be strongly related to the research questions. Likewise, Ellis (2003) suggested that once videotaping has been completed, SR should be done immediately. He termed it "immediacy condition," and such condition should be met for any introspection data to be reliable. Besides, Vik-Tuovinen (2002) further cautioned that researchers needed to ask questions that should be concerned only with what is videotaped, not anything else. In this way, the questions they ask are not contaminated by their own biases.

Just as any introspective instrument has their built-in flaws, so does SR. The potential flaw of SR is that participants under study are at times most likely to produce post hoc reasons or rationalizations that are not wholly in agreement with their behavior or performance in a given research task or context. So researchers themselves should be acutely aware of this potential flaw and resort, in turn, to some other instruments to remedy this situation and triangulate the data. Faerch & Kasper (1987) also reinforced the point that the introspective method should be used in combination with other elicitation methods to guarantee the reliability of SR data. Given SR's strength and weakness as an introspective instrument to investigate the online cognition and underlying mental processes of the participants, we still regard it as a very useful tool to elicit data from the consecutive interpreters about the types of difficulties they perceive in the course of performing a set of Chinese-English CI tasks.

4. The Present Study

4.1 Research questions

The present study aims to address the following three research questions:

- 1) *What are the major types of difficulties perceived by PTIs when they are engaged in CI?*



2) *Among the major difficulties, which can be categorized as cognitive and which as non-cognitive? And how do they affect the note-taking and note-related interpreting activities? and*

3) *What are the most likely causes that lead to the difficulties?*

The first two questions are descriptive; the third one is exploratory, aiming to explore and explain why the participants under study experience certain problems in note-taking and note-related interpreting activities.

4.2 Participants

We recruited six PTIs from the Graduate Institute of Interpreting and Translation Studies, Shanghai International Studies University as a naturalistic focal group for this study. These extremely sought-after candidates were special in that they were selected out of several hundred candidates through both written test and viva voce; that they were to be groomed by the most prestigious educational establishment of its kind across the mainland China to be professional international conference interpreters; and that they were to be assessed and accredited by senior UN interpreting experts at the end of two years' training course. Among them, five are males, one is female; their average age is 23 years old.

We are fully aware that such a puny pool of research participants falls far short of the quantitative requirement in empirical research, but the difficulty of having more PTIs available for interpreting research has been widely acknowledged as a challenge hard to overcome for various reasons. Withstanding the numerical handicap of this study, our focal group presents the strength that the participants recruited for the present study could be regarded somewhat as ideal PTIs, whose learning experience and learning process are highly representative of typical would-be conference interpreters and whose learning difficulties can then generalize to similar groups. This is the rationale for our convenient sampling.

4.3 Task procedures and materials

1) *Stimulated recall*

We used SR as the main instrument to elicit and collect data related to the three research questions. Through elicitation, the qualitative data were able to reveal part of the intricate cognitive state experienced by the participants in question while they were doing a CI task and to suggest the reasons why they performed in this or that way, and why they made this or that meta-cognitive decision. In other words, we pursued the following line of inquiry: from their overt and observable performance, we investigated the nuanced thinking processes behind their performance; and then we examined their cognitive and non-cognitive explanations based on their own rationalizations.

Specifically, we asked each participant to perform the designated CI task from Chinese to English in a mock environment quite similar to a formal conference room or booth to achieve the maximal ecological validity of interpreting (Shlesinger, 2002). The whole interpreting process was videotaped. After the task was completed, we queried each participant directly about their interpreting performance by replaying those footages. For example, by pointing to some specific footages, we asked such questions as: "Why are you pausing here?"; "Why are you frowning? What are you thinking about? Are you meeting some trouble? What is it?"; "Why are you taking notes so quickly?"; "What are you



looking for on your notepad?"; "Why are you hesitating in interpreting this sentence? Why do you stop here?"; "Why are you sighing at this moment?"; "Why are you rolling back your eyes? Are you encountering some problems here? What are they?"; "Why are you thumbing through your note pages so quickly?" etc.

2) *Post-task semi-structured interview protocol*

A post-task semi-structured interview was undertaken to understand the participants' interpreting training skills, the teaching methods they received, note-taking habits they were developing and, more importantly, the reasons behind their online instantaneous interpreting decisions and strategies. Another purpose of the interview was to further the credibility of the data elicited from SR (cf. Mackey & Gass, 2005). The interview was conducted immediately after the SR session. Questions were asked in Chinese like this: "How do you take notes?"; "Do you usually write a whole sentence or just several words?"; "By core words, what do you mean? Nouns, or verbs, or adjectives?"; "How do you mark the logical relationships between different propositions or chunks of information?"; "How do your teachers train you to realize this or that?"; "What do your teachers emphasize when it comes to note-taking? What is their reason?" etc. It was assumed that the data from the post-task interview verified or falsified what was recalled in their introspections (Gass & Mackey, 2007).

We selected five passages or excerpts as the interpreting materials for this study (see Appendix), among which, two are about the theme of international relations; another two about employment policies; and one about China's regional development policies. These themes, as opposed to daily topics, demand great attention for comprehension and memory because one cannot infer what follows from what has come before; neither can they anticipate what is to come next, as could be done in other interpreting situations. In addition, these five passages feature typical Chinese officialese, which are commonly found in governmental documents, files and editorials in government-sponsored newspapers in China. The sentences contained are long with many parentheses in between and shortened expressions like 4-character idioms and phrases.

4.4 Data elicitation and collection

We installed a small camera in a hidden place around 5 meters away from the participant who was performing the interpreting task, shielding it from view as much as possible and minimizing the "Hawthorn effect." Prior to the task, each participant signed a Research Agreement Form and each was paid 100 yuan (around 18 USD) for their participation. The whole interpreting process lasted approximately 20 minutes.

As soon as each participant completed the assigned task, we collected their note pad and immediately requested them to watch their performance footages, which were subsequently played slowly on a TV with a 48-inch hi-fi screen, and to answer their performance-related questions raised by the researchers. Sometimes we referred to their relevant notes, which also gave hints or cues about what they were recalling according to the stimuli, and asked further questions when they were pausing before the footages about their specific performance on the TV screen. At other times, footages were backtracked and replayed repeatedly when we felt confused over the answers provided by the participant. The whole SR protocol was recorded by a tape-recorder.



Immediately after completing the footage-related SR data collection, we conducted a post-task semi-structured interview with the participants, with a view to understanding their usual classroom interpreting training sessions, note-taking habits and the pitfalls they thought they had often encountered. This was done to further cross-check their SR rationalization data and to obviate any over-rationalization or even false rationalization, a major risk to the validity of the SR data. Interviews were also audio-taped.

4.5 Data coding, coding scheme and data analysis

1) *Transcribing the SR and interview data*

When all the data collection was completed, we transcribed each participant's interpreting output without correcting any error in it. We also transcribed onto paper the whole SR and interview data from the tape-recorder.

2) *Coding the SR data*

When all transcriptions were made, we coded the SR data and read them several times so as to discover common themes running through all participants' introspective data. This was done by repeatedly referring to the research questions and by referring to the coding scheme we had developed on the basis of the previous research, and especially on those specifically concerned with the difficulties with note-taking in CI experienced by interpreters both professional and non-professional. To be more specific, the coding scheme includes such categories as: (1) task-related difficulty in the first act, for example, ineptness at synchronizing the act of taking notes and the act of comprehending incoming SI (Dai & Xu, 2007; Lung, 1997; Gao, 2019; Chen, 2021); (2) training context-related difficulty in the second act, such as inability to adapt to the documents of Chinese officialese genre, characterized by one sentence containing several propositions and such sentences running successively in a passage; and ambiguities of noted tokens or cues that yield several interpretations and their encoded meanings are hard to determine at the time of retrieval and delivery (Xu, 2010); and (3) individual trainee-related difficulty in the third act, for example, emotional maladjustment to some subject matter (Xu, 2010) experienced by the trainee interpreters. At times, we read the transcripts of the semi-structured interview data repeatedly in order to discern clues about the common themes. Eventually, we developed a tentative scheme of three major types of difficulties common across the participant's introspective data. After this, we doublechecked the SR data to ascertain some specific difficulties that fitted into the scheme of different types. After several rounds of fine-tuning the scheme and the specific difficulties subsumed under each type, we developed a taxonomy of the perceived note-taking difficulties, as is shown in Table 1 in the next section.

3) *Comparing the SR data with the interview data*

It needs emphasizing that in the midst of coding the SR data, we also referred back and forth to the interview data to check and confirm whether the participants' introspections were solidly based on their interpreting experiences and habits, or they were merely the spontaneous inspirations and impulsive reflections of the participants. Such an approach helps build more confidence in the validity of the data. Finally, we counted the frequency of each difficulty emerging out of the SR data.



4) Examining the participants' notes and interpreting output

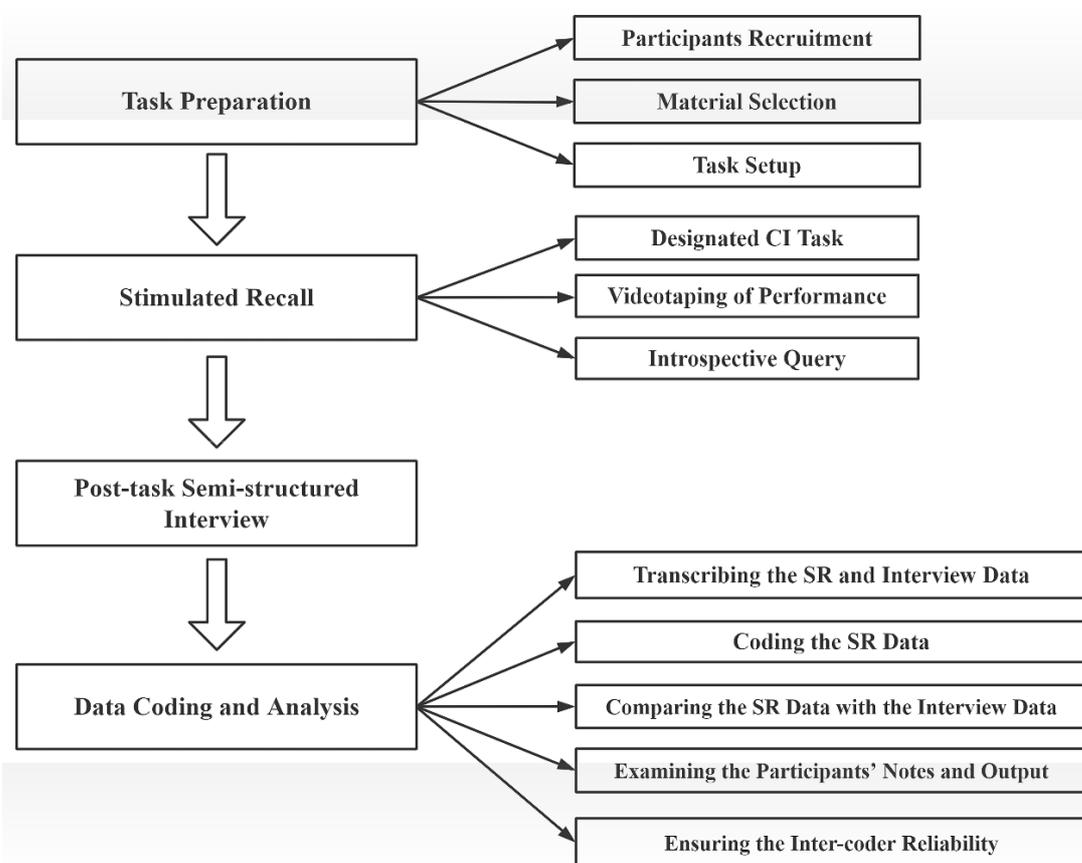
SR data shows that note-taking difficulties related to the participants' noting features were mentioned across the six cases quite a few times. With this in mind, we examined each participant's notepad, to which we cross-referred the SR data to further check the consistency and inconsistencies between them.

5) Ensuring the inter-coders' reliability

After coding the SR data, cross-checking the coding scheme and confirming its validity and reliability, we invited another two interpreter-coders to rate the coding scheme and the specific difficulties within each subsuming type. The inter-coders' reliability is significantly high (Cronbach's Alpha values is 0.87, exceeding the threshold of 0.7).

The research process is illustrated in Figure 1.

Figure 1. Research process



5. Results and Discussion

5.1 Major types of note-taking difficulties

Table 1 summarizes the major types of note-taking difficulties perceived by the six participants when they were performing the CI task. Subsumed under each type are detailed difficulties emerging from their recall.

Table 1. A taxonomy of note-taking and note-related difficulties

Type 1 Individual trainee- related difficulty in note-taking	Type 2 Interpreting Task-related difficulty in note-related activities	Type 3 Context-related difficulty in note- taking and note-related activities
•inadequate memory capacity;	•notes too ambiguous to be disambiguated precisely;	•unfamiliarity with SI subject matter;
•lack of preliminary mental processing of the SI;	•hidden logical links between the genre-specific SI sentences;	•difficulty in decoding relevant notes among the notes;
•cues not in congruence with SI;	•densely embedded propositions within SI sentences;	•difficulty in decoding meanings of tokens;
•tokens too scratchy to be legible;		

Notes: Tokens here mean the symbols or signs the participants used to represent Chinese characters, for example, ↑ means “adding, increasing”; ↓ means “going down or declining, decreasing.” Cues here mean Chinese or English orthography used to represent the source information, for example, the shortened cue “经发 (jing fa)” refers to “economic development.” The same two-character cue can also be construed as “management and development” and this is why confusion at times arises and interrupts the participants at the idea-reformulating stage prior to articulation.

The first type of difficulty “deficit in memorizing SI” indicates that sometimes participants have very limited memory capacity to store the incoming SI. The fact is that at the time of performing this task, they were at the beginning of the second year of training, still in dire need of improving their memorizing tactics and strategies. What is worth noting here is that some non-cognitive factors also pose obstacles to memorizing the SI. As shown in Table 1, Chinese genre-specific political documents are exemplified by long and convoluted sentences and densely embedded propositions, i.e., strings of



separate propositions are juxtaposed within sentences. Added to this overload on memory is their unfamiliarity with the current subject matter, which concerns themes like employment policies and guidelines, and international politics.

The second type of difficulty "failure to recall SI" subsumes the following three situations. The first situation is that the participants had trouble in re-identifying the signs and tokens used to signify the information conveyed by the speaker. Such failure pre-empted them from making any meaningful utterance or articulation. Put differently, in this case, note-taking did not make any sense. The consequence was the manifested pauses, hesitations, repairs of uttered words or sentences, reformulations of the sentential configurations, and semi-fluency or dysfluency in phonation or speech flows, even a sure sign of being unqualified for the job. The second situation is that the participants could not make out the original SI by turning to the use of ambiguous words, which again led to pauses or hesitations in speech production. And the third situation is that what was noted down did not mesh with the original meaning of the SI, resulting in meaning distortion or deviance.

The third type of difficulty is entirely related to the difficulties caused by the improper noting format (see also Gao, 2019). As indicated by Table 2 in the following section, all six PTIs explicitly introspected that although they paid almost all heed to the meaning of the propositions contained in the SI and to the logic relationship between them, only three of them made identifiable notes of the said logical relationships. For instance, "because" was tokenized by "be"; the "logical transition or shift" was symbolized by "but"; and "despite" indicating the concession relationship was indexed by "de"; However, by closely examining their notes, we found only one out of the six PTIs used the signpost "so" to mark the "result" relationship. Obviously, PTIs, after one full year of training, had developed a meta-cognitive awareness of what needs to be done when interpreting. However, awareness does not warrant the ability to turn mental awareness into professional performance. In other words, having declarative knowledge is one thing; being able to command procedural knowledge is quite another. Most likely, at the very moment of note-taking, they knew what was being noted, but with the information steadily coming in, the previous short-term memory traces were watered down, supplanted or even erased by other chunks of fresh information. As a result, the trainee interpreters, more often than not, could not remember clearly what has been delivered. Worse still, the notes taken of what was being delivered were randomly scratched, inconsistent, and hard to recognize and even illegible, although participants were instructed in classroom to systemize their noting symbols. For example, in some cases, one symbol can signal more than one meaning, giving rise to ambiguities or more than one decoding. Such situation certainly upsets the ongoing interpreting process and consequently the interpreting quality such as fluency, and information completeness. Taken together, these deviations from workable noting format disturbed and even disrupted the smooth message-formulating process and presumably, the ensuing conceptualizing process by fitting the target structure, both at syntactical, lexical and phonological levels, into the chunks of the formulated SI.

5.2 Frequencies of the difficulties under each type

Table 2 sums up the frequencies of the three types of difficulties as recalled by the participants.



Type 1 Individual trainee- related difficulty	Frequency (No.)	Type 2 Interpreting task- related difficulty	Frequency (No.)	Type 3 Training context- related difficulty	Frequency (No.)
•inadequate memory capacity	5	•densely embedded propositions within SI sentences	5	•illegible tokens among the notes	4
•words too ambiguous to be identified	3	•tokens too scratchy to be legible	3	•difficulty in locating relevant cues among the notes	1
•difficulty in retrieving SI from cues in notes	1	•hidden logical links between SI's genre- specific sentences	4	•unfamiliarity with SI's subject matter	4
•cues not in congruence with SI	4	•difficulty in re- identifying the inter- propositional logic	2	•tokens too ambiguous to decode immediately	3
•hostility or repulsiveness toward the genre-specific subject matter	1				
Sum	14		14		12

Overall, the occurrence of those difficulties varies with participants. This is especially so when it comes to the type of difficulties related to memory deficit, familiarity with the topic or subject matter, improper note-taking format and illegible notes. In light of this situation, it is reasonable to attribute the discrepancies to both cognitive factors and non-cognitive factors - in this case, textual features, as is corroborated by their introspection data.

5.3 Possible causes for the note-taking and note-related interpreting difficulties

Thus far, we have described the different types of note-taking difficulties perceived by the participants in question. What, then, are the likely causes of the difficulties mentioned above? This section presents the causes that emerge out of the SR data and the post-task interview data. Specifically, the main causes are individual interpreter-related, interpreting task-related, such as complex structure of the source language; high density of propositions embedded in the SI; unclear or hidden logical links



between those propositions. They are also related to the training context; unfamiliarity with or even resentment toward the subject matter. Each cause will be discussed in detail in the following.

1) *Genre-specific linguistic structures of the source information*

As mentioned in Section 4.1, the first type of difficulty is largely caused by textual features such as long-distance dependency relationship between elements within a sentence, long and convoluted sentence structures, etc. This is evidenced by the following excerpt from the post-task interview with a participant.

Because the preceding content was too long, how to use English to express its following elements, how to cut the large chunk into smaller and shorter clauses prevented me from articulating smoothly and fluently, so I paused...; I was feeling strained and stressed when I was comprehending the Chinese information..., especially those long sentences and paragraphs. Too many coordinate elements...too difficult to interpret those sentences beginning with “all these...” or “this...”. The difficulty was that I had too much information to process right then. As for the Chinese structure, the subjects were too long; the coordinate components too many and sometimes I was influenced by the original Chinese structures and cannot come up with other alternative structures to interpret them in English with the original meaning unchanged or kept intact.

(Excerpt of interview transcriptions from PTI Student# 2)

By cross-referring to this participant's notes and his interpreting output, we found that some cues and tokens jotted down on his notebook notwithstanding, they contained more contents than met the eyes; and that he could not recall and retrieve the majority of the original SI. In addition, his Chinese cues and tokens could be interpreted in more than one way. That is why he made more than a few pauses, hesitations, backtrackings, slow phonations, incoherent interpretations, as manifested in the videotaped performance, giving a general impression of being less fluent in interpreting.

2) *Densely embedded propositions within sentences*

The participants under the present study are mostly trainee interpreters who have yet to develop their own unique systems of taking notes, still lacking interpreting experience and expertise in dealing with tasks that contain imbricated propositional information. As has already been pointed out, this is mainly due to their awkward distribution of limited cognitive resources between listening (comprehending) and writing (see also Chen, 2017; 2020). The following excerpt illustrates this point very lucidly:

There was so much information there; I had to rack my brains to process it, that is to say, I tried desperately to memorize a bit by grasping the main information structure and leaving out many details. The result was, I had taken a lot of notes; some I couldn't quite recognize. For example, among my notes, there were words like “周”, “敏”, but when I interpreted shortly afterwards, I could not clearly identify the meanings contained in or represented by the two words; I had no time to think them out. The information following the expression “财务” seems to be bombarding, I mean, it was so densely concentrated that I had no time to make a preliminary processing of them before I took notes. “Northeast” should contain different development trends in four different parts (eastern, western, central and northern parts, according to the SI) in China, but I could not remember the specific development plans; nothing about the eastern development had been noted; the information was so much that I completely failed to take notes in this regard...and I had to rely on my impression



and instant judgment to interpret; the information contained in the two tokens “经济 (jing ji)” (economy) and “持续(chixu)” (sustainable) was so rich, too....

(Excerpt of interview transcriptions from PTI Student#5)

This instance further substantiates the theory of mental model about the domain-specific knowledge and encyclopedic knowledge; that is, the more encyclopedic knowledge an interpreter has in their possession, the more likely they are able to comprehend the SI quickly and precisely. On occasions, for an expert interpreter, even several words can help activate a large chunk of related knowledge on a specific domain already stored and crystallized in his long-term memory. Or to put it another way, they are in possession of different mental models on different subject matters, and such expertise enables them to form an ‘episodic buffer’ in their ‘central executive’, facilitating them in comprehending relevant information effectively (Hambrick & Engle, 2002; see also in Baddeley, 2003). Since the participants under the present study were not familiar with the subject matter, as will be discussed later on, they were bound to fail to retrieve the bulk of the relevant SI. This common cause constitutes one of the major causes of their difficulty with note-taking.

3) *Hidden logical links between propositions*

The five short excerpts chosen as the materials for the interpreting task share such common features as many propositions embedded in sentences, weak or unclear outward linguistic markers to manifest the hidden logical links between sentences. Great endeavors are required in order to grasp the subtle logical relationship between densely embedded propositions. This difficulty forced the participants to pause and think while performing the task.

At that moment I was making a logical analysis; I did not know the logical relationship between what had been said before and what was to be said; I was thinking of the subject of EU-sentence...that is, what was the content about China and the EU. I could not jot them down, because there were so many coordinate subjects and it was hard to make an immediate identification of their subjects right then. I even had trouble in capturing the Chinese information from the SI while listening; when one sense group ended, another sense group came flooding in. I did not know the logic between them. You see, I had to open my mouth and interpret even before I could make sense of the logical relationship between these successive strings of information...”

(Excerpt of interview transcriptions from PTI Student #3)

As can be seen here, textual features presented both an overly cumbersome load to their comprehension and a tall order to their note-taking process.

4) *Unfamiliarity with or even resentment toward the subject matter*

The last remarkable cause is PTIs’ unfamiliarity with the subject matter. This could be used as a common denominator to subsume the aforementioned three particular causes. As a matter of fact, participants were not familiar with the official-sounding subject matter, and some of them even resented such official-sounding topics and bureaucratic-sounding tropes. The following excerpt very tellingly proves this.

I think this subject matter is really tough. It is about development of the western part of China. I don't think I was in good form because I was not familiar with the topic. When the first sentence



came in, I felt confused and my hand could not write the contents down. I think the topic was so broad and empty, without any specific details and therefore hard to note it down. Frankly speaking, I hate such official language; I hate such official political language, they are like political slogans, with too many Chinese characteristic features. Slogan-like information is too empty to be memorized, lacking specific details and only having framework of information. While listening, you thought you could memorize them; but actually after listening, you could recall nothing. That is the puzzling point. I think I do not know much about the political information. Also I know China has a special set of idiomatic expressions for these official things. Now we are still learning about those officially sanctioned standard expressions...”

(Excerpt of interview transcriptions from PTI Student # 4)

The difficulty perceived by this participant demonstrates her disinclination or even loathing toward the interpreting topic. This is affirmed also by the research conducted by Hu et al., (2016) who found that information is retained in a transient, limited capacity privileged and influenced by stimulus-driven and goal-directed processes. Although the participant under the present study sounded quite naive and unprofessional, it does reveal her true emotions or gut feelings. Interpreters, after all, are individuals who have their likes and dislikes, what is to their best advantage and what is in their disfavor. This difficulty provides another research dimension in which we could explore how interpreters' idiosyncrasies and emotional biases affect their performance and to what extent they can lead to interpreting pitfalls.

6. Conclusion

The present study employed SR as a tool of inquiry to investigate the major difficulties perceived by six PTIs in CI, and the most likely causes behind those difficulties. Analyses of the data from the SR and the complementary data from the post-task semi-structured interview suggest that the major difficulties they perceive fall into four types of cognitive and non-cognitive nature. The cognitive factors are principally their limited working memory capacity and cognitive resource, which do not allow them to have preliminary in-depth processing of the incoming SI. The cognitive factors directly give rise to the deficiency in note-taking performance. Added to the difficulties are the non-cognitive causes, which are largely embodied in the textual features of the interpreting materials. Specifically, they are: long and convoluted sentence structures in Chinese genre-specific political documents; hidden logical connectors or weak links between propositions in syntactic coherence and dense propositions tightly crammed or deeply embedded in loosely structured sentences, etc. These features weigh down further on their restricted memory capacity, depriving them of ample time to retain its traces in working memory and take immediately revealing notes. Furthermore, lack of adequate exposure to, or training of, subject matters of similar genre cause more difficulty.

This study has pedagogical relevance to interpreting teaching. How to minimize the imbalance between limited cognitive resource and highly taxing interpreting tasks, or, for that matter, how to maximize the efficiency of distributing the limited cognitive resource while taking notes, remains one of the essential issues in interpreting teaching. The present study reveals that it is necessary that interpreting instructors should expose trainee interpreters to Chinese-specific political texts, help them analyze, understand and grasp the textual features of such genre, and train them to respond to such features with highly effective interpreting skills and provide useful tips in classroom training sessions.



Being professional in this regard means that interpreters should be able to adapt themselves to interpreting texts of different genres.

Another relevance to classroom interpreting training emerging out of the present study is that, for an interpreter to be professional and definitely, to be capable of taking notes, they should enrich their encyclopedic and domain-specific knowledge. A capable interpreter can take the most efficient and meaningful notes if they are familiar with or well informed of the subject matter, as has been proved by some studies (Hambrick & Engle, 2002; Gao, 2019); alternatively, the effectiveness of note-taking and the ease of note-taking somewhat hinges upon the note-taker's crystallized background knowledge about a certain topic or subject in their long-term memory, which ultimately enhances their comprehension greatly (Baddeley, 2003: 202; Hu, 2008; Was & Woltz, 2007).

This study also has methodological implication for interpreting research. SR has not been commonly adopted for interpreting studies. The most likely reasons are that to install or place a videotape in a booth or language lab may affect the naturalistic performance of interpreters, creating the "Hawthorn effect" and vitiating the validity and authenticity of the data; that the reliability of such post-task SR introspection made by individuals may be compromised; and that the generalizability of the findings yielded from such qualitative data (Swain, 2006: 97-114) might be challenged as a result. Considering these reasons, the present study is an attempt to integrate the participants' notes, their actual interpreting output, and a semi-structured post-task interview to elicit the data about their note-taking habits, interpreting obstacles encountered in training, and the reasons behind them, in order to triangulate, cross-check and confirm the validity of the SR data and minimize the degree of subjectivity or biases.

This empirical study has its limitations in that it only took a very limited pool of PTIs as subjects, six participants in this case, leaving some other questions under- or unexplored. For example, how did they comprehend the incoming SI? How did they parse the SI for instantaneous comprehension? How did they take notes of those long and convoluted sentences with densely-imbricated propositions – a typical feature of Chinese political discursive genre? Efforts to address these questions with the instrument of SR will uncover the intricacies of interpreters' note-taking behavior in particular and interpreters' simultaneous bilingual processing performance in general. It is therefore suggested that further SR-based research together with sophisticated and precisely targeted instruments (for instance, Chen, 2017; 2020) be conducted to obtain more data about the online cognitive activities of note-taking involved in CI with improved validity and reliability.

Declarations and acknowledgement

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Appendix: Materials for the interpreting task

1. 我们认真执行“以邻为善、以邻为伴”的方针和“睦邻、安邻、富邻”政策，推动和引导东亚区域合作。//我们在朝鲜半岛核问题上积极发挥了建设性作用。//我们妥善处理周边敏感问题，全面推进同广大亚洲邻国的互利合作。//
2. 我们在全面加强同广大发展中国家关系的同时，努力发展与大国的关系。//同美国关系总体上保持稳定和发展。//同俄罗斯的战略协作关系进一步深化。//中国与欧盟全面战略伙伴关系的内涵不断得到充实，在经贸、科技和国际事务方面的合作取得长足发展。//
3. 中国政府高度重视就业问题，//坚持以人为本，树立全面、协调、可持续的发展观，//促进经济、社会和人的全面发展，为进一步解决好就业问题提供了思想认识基础。//
4. 经过多年的探索和实践，解决就业问题的大政方针已定，方向明确，措施配套，//以市场为导向的就业机制初步形成，为解决好就业问题提供了政策和机制保障。//经济保持持续、快速、协调和健康发展，//财政收入增长较快，//经济结构调整顺利推进，//企业经济收益明显好转，//第三产业发展加快，//必将对就业形成强有力的拉动。//
5. 坚持推进西部大开发、振兴东北地区等老工业基地、促进中部地区崛起、鼓励东部地区加快发展的促进地区协调发展战略的实施以及城镇化步伐的加快，为解决就业问题带来新的机遇。//

