# 從眼動測量檢視英中逐步口譯筆記原則

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## 摘要

在逐步口譯過程當中，筆記是口譯員相當重要的一項工具。口譯員利用筆記幫助整理分析所聽到之訊息，並在產出的過程當中幫助自己的記憶，讓訊息產出更加完整流暢。傳統逐步口譯筆記教學中常見的兩大原則為：直寫格式優於橫寫、筆記語言則以目標語優於原語。過往許多學者就筆記技巧和原則都提出過許多不同觀點，而這些學者就自身經驗所提出的論點雖都言之有理，但缺乏更科學的實證支持，因為逐步口譯筆記歧異性過大，很難就逐步口譯筆記加以操弄進行實驗。

但此等限制如今已有可行之研究方法與技術在一定程度上予以克服。眼動追蹤方法即為其中之一。在認知心理學研究中，眼動追蹤方法之應用已有數十年歷史，透過眼動追蹤，實驗者可以在相對自然的情境下利用眼動儀記錄受試者的眼動情形，從而瞭解受試者在從事作業時的生理（眼動）反應以及相對應的認知活動。例如認知心理學學者即曾據以研究過同步口譯、視譯等作業過程，希望從中觀察譯者的認知過程，但卻少有逐步口譯的相關研究。

本實驗利用事先備妥之筆記克服不同譯者筆記風格差異過大等因素，並利用眼動儀來追蹤受試者在逐步口譯過程中的眼動情況，藉以驗證上述傳統逐步口譯筆記教學的兩大原則，盼除了找出有助加強口譯筆記教學的實證基礎外，並填補目前眼動追蹤應用於逐步口譯相關研究的缺口。

關鍵詞：逐步口譯筆記、眼動、眼動追蹤

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# An Eye Tracking Study of Note-taking Practices in English-Chinese Consecutive Interpretation

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## Abstract

Note-taking is an important aspect of consecutive interpretation, and there are some general guidelines developed over the years in the classroom and in practice. A common practice is to write the notes vertically instead of horizontally. Another method taught in interpreting schools encourages interpreter trainees to take notes in the target language; that is, aside from the symbols and arrows, the interpreter should try to use the target language for note-taking as much as possible.

In support of these conventions, instructors of interpretation often refer to their personal experience as well as the collective hard work of generations of interpreters. However, the status of interpreting as a credible academic discipline cannot be built without sufficient empirical evidence yielded by scientific investigations into assertions of one kind or another regarding interpreting techniques.

One of the most promising approaches to securing empirical evidence in this area may be through the eye tracking method. In the field of cognitive psychology, the eye tracking technology has long been used to study cognitive processes. Eye movement data are very valuable in studying reading and other information processing tasks, as these movements are seemingly sensitive to many cognitive processes. By observing eye movements, one gains understanding of the physical reactions and cognitive activities of the person performing a given cognitive task.

As the eye tracking method is non-invasive, it will be interesting to use it to study how interpreters decipher the notes in different layouts and languages. This study may be critically important in laying the groundwork for related studies in the future, and produce indicative results determining whether the above-said conventions

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are in fact useful techniques.

The present study is one of the pioneering studies that investigated the common practices of CI note-taking by adopting the eye tracking method, which has proven to be an effective technique in observing and analyzing moment-to-moment cognitive processes during consecutive interpretation. The results show that the conventions in CI note-taking—verticality and the use of target language—are in fact valid recommendations not only supported by practitioners' years of experience but also proven by empirical evidence.

Keywords: Consecutive interpretation note-taking, eye movement, eye tracking method.

# 1. Introduction

Translation is the conversion of written texts into different languages; interpretation, on the other hand, is the conversion of spoken words between different languages. However, it is more important to convey ideas, rather than sticking to definitions in dictionary, as the main purpose of translation and interpretation is to facilitate communication. In consecutive interpretation, the interpreter speaks after the source-language speaker has finished a segment of the speech. During consecutive interpretation, the speaker needs to pause from time to time, in order for the interpreter to render his/her oral translation. When the speaker speaks, the interpreter takes notes as an aid to their memory. The notes may consist of diagrams, arrows, symbols, abbreviations, letters, numbers, and anything that the interpreter finds helpful. When it is his/her time to speak, the interpreter goes back to the notes, deciphers what he/she has written down, recalls form his/her own memory, and deliver the interpretation.

## 1.1Background of Study

In consecutive interpretation, there are five stages as illustrated by Weber (1989) and cited by Al-Zahran (2007) - hearing, listening, analysis, memorization and/or note taking, and interpreting. The note-taking phase involves the interpreter’s conscious choice of parts of the original message to be memorized, and others to be taken down as notes. The role of memory is essential, and it is impossible for interpreters to depend solely on notes without a good memory, proper understanding, analysis and re-expression (Al-Zahran, 2007). There is a consensus among researchers that note taking is a means to aid the interpreter’s memory, which means that the interpreter should not take down all the source language information. When taking notes, interpreters must first analyze the information, and write the information down in an abstract form.

There are some general guidelines developed over the years for note taking. A common practice is to write the notes vertically instead of horizontally, which is contrary to how people normally write. Another method taught in interpreting schools encourages interpreter trainees to take notes in the target language; that is, aside from the symbols and arrows, the interpreter should try to use the target language for note-taking as much as possible. This means that the conversion is done at the stage of note taking rather than during production. However, the discussion on the form of

notes has called for more empirical research to resolve the controversy over the language to take the notes in (Al-Zahran, 2007).

This experiment aims to find empirical evidence to support the common practices in consecutive interpretation. Do the two previously mentioned conventions work to the interpreter's advantage? More empirical evidence is needed to validate the claims.

One of the most promising approaches to securing empirical evidence in this area may be through the eye tracking method. In the field of cognitive psychology, the eye tracking technology has long been used to study cognitive processes (Rayner, 1998). It has been noted that advancement of computing technology has improved the efficiency and precision of eye movement recording, allowing researchers to obtain more accurate measurements. According to Inhoff and Radach (1998), eye movement data are very valuable in studying reading and other information processing tasks, as these movements are seemingly sensitive to many cognitive processes. By observing eye movements, one gains understanding of the physical reactions and cognitive activities of the person performing a given cognitive task (Huang, 2011).

The present study applies the eye tracking method to investigate the two conventions in consecutive interpretation note taking. This study may be critically important in laying the groundwork for related studies in the future, and produce indicative results determining whether the conventions are in fact useful techniques.

## 1.2 Research Questions

The present study aims to provide empirical evidence to validate the aforementioned note-taking conventions. The research questions are as follows:

1) Are vertically written notes really more ideal than horizontally written notes for they result in less cognitive loads during deciphering and rendition? Will eye movements reflect this?
2) Are notes written in target language, as much as possible, really more ideal than notes written in source language, as they result in less cognitive loads during deciphering and rendition? Will experiment results validate this?

# 2. Literature Review

In this chapter, studies on consecutive interpretation, note-taking, and the eye tracking method will be reviewed in order to provide a basis of understanding for the current study.

## 2.1 Consecutive Interpretation

Consecutive interpretation may be viewed as consisting of three stages: listening and analyzing (comprehension), memorizing and/or note taking (message retention), and interpreting or re-expression (Lee, 2000; Tsui, 2005). Simultaneity and attention sharing between various mental tasks are not characteristic of SI only, but are also present in CI. The interpreter is simultaneously involved in listening to the source language discourse, analyzing its segments, deciding what to note down and in what form and what to memorize. In a similar vein, divided attention does exist during production because the interpreter has to simultaneously deliver his/her rendition and monitor his/her output (Al-Zahran, 2007). Therefore, interpreters will have limited capacity of short-term memory, or working memory, because simultaneity and divided attention impair and reduce recall ability, making CI notes a vital complementary to memory. Memory required for CI is to process the message before it is taken down on notes, or to store information that the interpreter decides not to write down (Lee, 2000). Therefore, notes are an important aid for interpreters to fill in the gaps (the information not memorized) during the re-expression stage, and guidelines for note taking have been developed in order to help the interpreting students over the course of their training.

Instead of viewing CI as a three-staged process, Gile (as cited by Lee, 2000; Tsui, 2005) identifies in the effort model two stages of CI: “a listening phase”, during which the interpreter listens to the source language message and takes notes, and “a reformulation phase”, during which the interpreter delivers the source language speech in the target language with the help of notes and memory. The listening and analysis phase is represented as follows:

$$\text{Listening} = L + M + N + C$$

Where L refers to the listening and analysis, M to short-term memory, N to note taking and C to the coordination efforts. The listening and analysis effort involves

comprehension-related operations. The M component occurs between the reception of the source language information and the time this information is written down, the moment the interpreter decides not to note it down, or the moment this information fades away from the short-term memory. The note-taking effort consists of decisions as to which information to note and how to note it and the execution of these decisions. The coordination effort refers to the set of operations intended to create harmony between the other decisions involved and their implementation.

The reformulation phase is as follows:

Reformulation = Rem + Read + P

Where Rem refers to the operations involved in recalling information from memory, Read to reading information from notes, and P to the implementation of the speech plan. The sum of the efforts involved in the process should not at any stage exceed the interpreter's processing capacity limits; otherwise, problems are bound to occur (Al-Zahran). Based on this model, it is evident that interpreters are under considerable amount of cognitive loads when performing CI, and if the interpreters experience relative ease (needing less effort) reading the notes, it will reduce the cognitive loads during their tasks.

### 2.1.1 Rules for Note-Taking

Up to this point, most of the literature with regard to CI note taking revolves around recommendations on what interpreters' notes should look like or how note taking should be taught. Most of these recommendations are offered on the basis of personal experience and/or opinions only (Dam, 2004). Herbert, Rozan and Van Hoof are three pioneers who explored the methodology of interpretation. All three insist that note taking is a personal system of symbolization, but each has given own set of recommendations for note taking (Lee, 2000).

Herbert (1952), Rozan (1956) and Van Hoof (1962), the three pioneers of the methodology of interpretation believed that note taking is a personal system of symbolization. Symbolization is independent of target language/source language restrictive ties. Herbert believed that interpreter should have a set of symbols that serve as a reminder of the important ideas. Logical analysis is important, and should

be aided by margins and horizontal lines to help the interpreters to organize the divisions and subdivisions of speech.

Rozan (1956), Van Hoof (1962, modeled on Rozan) and Ilg (1980) defined the rules of note taking: “take down bare bones, to be fleshed out later”. (Ilg and Lampert, 1996: 79). Rozan (1956) put forth a few simple principles to make his system straightforward, as he believes that the simpler the instructions are, the more likely the users are to follow them. These are the “Seven Rules” of note taking.

First, Rozan pointed out it is more important to note the idea rather than the words. By analyzing and noting the ideas, the interpreter will avoid mistakes and difficulties in delivery. Interpreters must “concentrate on the major idea and how this can be noted clearly and simply (preferably in the target language, although this is not essential.)” (Rozan, 1956).

The second rule for note taking is the abbreviation of words. Rozan stressed the importance of abbreviating intelligently, keeping symbols to a mere handful (Ilg and Lampert, 1996). Rozan believes that by abbreviating a word or an idea—in forms of symbol or letters—it can also help to give indication of gender, tense, and register.

The third rule of note taking is to note the links. If the relation of an idea to previous ideas is not clearly noted or indicated, the meaning can be distorted. It is important to never miss out the links.

The fourth rule and the fifth rule are regarding negation and emphasis. These are two essential elements of speech, and should be noted with no ambiguity. Rozan proposed using lines—a line running through a word or symbol to indicate negation, or a line underneath a word or symbol to show emphasis.

Verticality and Shift (the seventh rule) form the backbone of Rozan’s note-taking system. Verticality means taking notes from top to bottom instead of from left to right. The method makes it possible to group ideas logically, which allows a complete and immediate synthesis when interpreters read back to their notes. Another advantage of vertical notes is that it allows noting links more easily and clearly. Interpreters can place different elements of the text above or below one another, a technique referred to as “Stacking” by Rozan. The use of brackets is also an important part of the verticality system. There are certain elements in speech that are mentioned to clarify

or to highlight a particular point, but are not integral parts to the speaker's train of thought; these should be bracketed below the main element to which they refer (Rozan, 1956).

Shift is another essential part of Rozan's system. It means "writing notes in the place on a lower line where they would have appeared had the text on the line above been repeated." (Rozan, 1956). This allows easier note taking, as repeated words are not required to be written down, and it also helps the interpreter to group ideas with the same or similar value.

Similarly, Jones (1998) proposed the diagonal layout of note taking. Diagonal layout can properly reflect the structure of the speech. Diagonal layout can be regarded as the equivalent of shift and verticality proposed by Rozan, as diagonal layout consists of top to bottom note taking, as well as indentions (shift). The rules by Rozan and Jones are quite similar to the ones taught at interpreting training programs, and the diagonal layout, at least in this study, is referred to as vertical layout.

In addition to the layout of the notes, interpreting trainers and researchers are also interested in what language to use in note taking. Some proposed using the source language, so that the interpreter does not have to worry about conversion during the listening and note-taking stages; on the other hand, some advocated the idea of taking notes in the target language, claiming that it would help the interpreter during the production stage. Most authors in the field of note taking tend to take one of the two opposing positions: some recommend using the target language (TL) (e.g. Herbert, 1952; Rozan, 1956; Seleskovitch, 1975; Seleskovitch & Lederer, 1989), whereas others argue that the source language (SL) may be a better choice (e.g. Ilg 1988; Gile 1995). Those who advocate for the use of target language support the idea for two basic reasons: one, target language logically forces the interpreter to move away from the surface form of the incoming speech and should therefore ensure better processing of the speech; and two, writing in the target language is thought to facilitate production of the target speech (Dam, 2004), because during CI, the interpreter will not have time to decipher notes at delivery (Lee, 2000).

However, a smaller group of authors question the target language recommendation, because they believe that writing notes in the target language requires language conversion during note-taking and therefore adds to the number of tasks (or functions) the interpreter has to perform during the listening/analyzing phase.

At this stage, the speaker sets the pace, and there should theoretically be a higher degree of complexity, and is more capacity-consuming than the production stage (Dam, 2004). Thus, taking notes in the source language is thought to be easier and faster than in target language, because the interpreter can simply write down what he or she hears. However, Seleskovitch (1975), Kirchhoff (1979) and Andres (2002a) mention that they have observed a mixture of source and target language (cited by Dam, 2004).

According to Liu, the format of CI notes, referred to as the "utilization of space on paper" in Liu's book, is one of the most important principles of CI note taking. Liu proposed four major principles: verticalization, indentation, division, and superposition (Liu, 1993: 53).

For this study, the main interest of the researchers is CI from English into Chinese. In her book on CI English into Chinese, Liu Minhua (1993) has dedicated one chapter specifically for the note taking part of CI. Liu (1993) mentioned that there is not a set of rules or principles for note taking, and notes from different interpreters will not look the same. Again, Liu recognized that notes are very personal. (Liu, 1993: 44).

Verticalization, as discussed earlier in this chapter, is an idea put forth by Rozan. Liu further argued that verticalization is a method of arranging messages during CI note taking. When interpreters note messages they hear in order from left to right, then later on when they decipher the notes, they must also move their eyes in the same direction; after they finish reading one line of their notes, they have to move their eyes to the very left of the notes to the beginning of the next line. This requires more effort, and will hinder the speed at which interpreters decipher the notes.

Another reason for verticalization is that interpreters must break free from all lexical structures. Verticalization allows the interpreter to freely arrange the messages regardless of the order in which they hear the messages. Same thing can be said during the reproduction phase of CI, the interpreters can freely decide what to say first, or even omit some information they have written down (Liu, 1993: 54).

Liu also talked about indention, which is also an idea put forth by Rozan. Verticalization alone is insufficient to fully display the relationship between messages. By using indentions, interpreters can show the hierarchy of the different messages.

Liu discussed the idea of division, which is a line drawn at the end of a complete message. This division does not necessary indicate the end of a paragraph or sentence. As long as the meaning of the message is fully captured, then a line can be drawn. As indention is a means of grouping ideas and messages, division serves a similar purpose but marks the end of a complete message (Liu, 1993: 57).

The last principle discussed by Liu is superposition. It is the grouping of related words or symbols. Interpreters can easily tell that these words or symbols are closely related and have similar statuses.

As for what language to use for CI note taking, Liu explained that at the beginning of the training, students have the inclination to write down as many words and sentences of the source passage as they can. This may be an indication that the students have not analyzed the information they heard, and are simply trying to write down everything blindly. Some trainers thus ask students to take notes in target language, which shows that the students have "processed" the source language information. This can only be a means of training, but not a principle for CI note taking. Because for interpretation, interpreters should not be bound by the words in either source language or target language. Also, there should not be too many restrictions on note taking, as it is required for interpreters to note down the things they hear quickly and correctly. Therefore, interpreters should be able to take notes in any language or symbol, as long as they find it helpful.

## 2.2Eye-Tracking Method

Extending the application of eye-tracking techniques to research in Interpreting Studies (IS) has not been taken into consideration by many researchers. There are only a few articles based on studies directly applying eye tracking to IS. In recent years, more researchers are turning their attention towards the application of eye-tracking method in interpretation or translation studies. Nonetheless, it is best to first introduce the basics of eye tracking method, which is predominantly used in the field of cognitive psychology, as many may not be as familiar with it.

### 2.2.1 Eye Movements

Eye-trackers enable researchers to observe eye positions and eye movements through which they can thoroughly understand the physical reactions and cognitive

activities of the person performing cognitive tasks. According to Inhoff and Radach (1998), “Oculomotor measures provide distinct methodological advantages in the study of cognitive and perceptual processes. They appear sensitive to a wide range of ‘cognitive processes’ and they can be obtained under relatively natural task conditions; hence, the growing acceptance and popularity of these measures.”

When people read, their eyes make fast movements called saccades. Between saccades, the eyes remain somewhat still; these are called fixations (Rayner, 1998). Saccades are rapid, and during these fast movements of the eyes, sensitivity to visual input is reduced. Researchers refer to this reduction as saccade suppression. This indicates that during eye movements no new information is obtained because the eyes are moving so quickly that only a blur is perceived (Rayner, 1998). Some experiments have found evidences to suggest that some cognitive activities are suppressed during saccades. However, the tasks used in most of these studies are relatively simple, it will be interesting to determine whether thinking is suspended during saccades in more complex talks (Rayner, 1998).

On the other hand, when the eyes are relatively still, they are said to be in fixation. However, eyes are never really still. If examined carefully, there are tremors of eyes during fixations. These tremors are assumed to be related to perceptual activity, and are often regarded as noises during experiments (Rayner, 1998). It is during fixations, which are periods of relative stability, that visual information is extracted (Radach & Kennedy, 2004).

Fixations and saccade can be used to index cognitive processes. This indexing has been guided by two processing assumptions—eye-mind and immediacy assumption. According to these assumptions, the location of a fixation coincides with the cognitive processing of text at that location, and an ensuing fixation duration is determined by the area’s perceptual and cognitive analysis. The viewing duration of an area of text, or some derivative of it, can be used to index its perceptual and linguistic analysis (Inhoff & Radach, 1998).

During different reading tasks, the eyes will move in different patterns. Rayner (1998) pointed out that when a person is reading silently, the fixation durations tend to be shorter, but when the person is reading the text out loud, the fixation durations are longer.

Inhoff & Radach (1998) pointed out that researchers are interested not only in the direction of saccades, saccade amplitude, or fixation durations; the viewing duration of an area of text can be used to index perceptual and linguistic analysis. They also listed a series of measurements that are often collected for analysis. For example, skipping rate is computed as researchers are interested on determining the time spent to process the words skipped during reading. That is, during reading, the eyes move from one fixation to another, yet some words never receive any fixations. When and how does the reader process these skipped words? When interpreters decipher their notes, it will also be necessary to examine the skipping rate, since interpreters skip some words, or parts of the note, as well. It will be interesting to see which words are skipped.

Another important index is regression. Roughly 10-15% of all fixations are regressions, yet very little is really known about what causes them (Rayner, 1998). Readers are more likely to regress to a word on the current line than to words on previous lines. However, when they do regress further back in text, despite backtracking movements, readers often have fairly good spatial memories for where they went wrong in comprehension and make fairly accurate saccades to that region of text. Frazier and Rayner (1982) demonstrated that when readers encountered a word indicating that their prior interpretation of the sentence was in error, they often made a regression as soon as they encountered disambiguating information. Therefore, it is likely that many regressions are due to comprehension failures.

Approximately 15% of the words in text are refixated. Refixations on a word are often caused by originally landing in a “bad” place in a word and that processing of the word is distributed over two or more fixations. When readers make multiple fixations on a word, the first fixation is often longer than the second. Although some refixations are made because the reader was in a bad place, refixations are also often made for other reasons. For example, Balota et al. (1985) showed that readers were less likely to have their next fixation remain in the currently fixated word if it was predictable in the sentence context. This reflects that the readers are having relative ease reading the text at the moment.

Nowadays, because the eye tracking method is non-invasive and easy to use, interdisciplinary studies between different fields have been conducted. Eye movement data are very valuable in studying reading and other information processing tasks.

### 2.2.2 Interpretation Related Eye-Tracking Experiments

Many eye-tracking experiments have been done to explore cognitive processes in reading. Interpretation is a task that involves multiple cognitive processes, yet, there have only been a limited number of studies that applied the eye-tracking technique to interpretation research. Scarce as they are, previous studies have lent strong support to the applicability of the eye-tracking method to studying interpretation. This section will proceed to review two previous works in the field of interpretation.

The Revised Hierarchical Model (Kroll & Stewart, 1994) argued that the task of translating/interpreting 'single words' into the second language is more cognitively demanding than into the first language. Chang (2009) attempted to test the validity of Revised Hierarchical Model at a textual level through collecting physiological and neurological measures. He employed the eye tracking method and fMRI in his experiment. He did two eye-tracking experiments: Mandarin (A) into English (B) and Spanish (A) into English (B).

In Experiment 1, each participant had to carry out four tasks: translate from English into Mandarin, type English, translate from Mandarin into English, and type Mandarin. The sequence of the tasks was random.

In Experiment 2, the six tasks were: read Spanish, read English, type Spanish, type English, translation from English into Spanish, and translate from Spanish into English. The change of task sequence was due to results of Experiment 1.

The results and findings of the Experiments show that the eye-tracking technology has a broader applicability to the field of T&I studies. They also showed that A to B translation was more cognitively demanding than B to A translation, which supports the validity of the Revised Hierarchical Model.

In 2011, Huang did another study related to interpretation. There are three components of interpreting: comprehension, reformulation, and production. Up until that point, no study had previously explored issues such as the process of comprehension in interpreting to address specific issues of the horizontal and vertical translation perspectives along with scientifically prove whether concepts such as "read ahead" are just a myth or actually exist in sight translation (ST) to gain more insight into the process of comprehension in ST. This is exactly what Huang (2011)

tried to accomplish. Huang (2011) employed the eye tracking method to investigate the process of sight translation. The research focused on the comprehension component in sight translation, and tried to address the validity of the horizontal (meaning-based translation as opposed to literal translation)and the vertical perspectives of interpretation. Huang's initial research question was whether sight translation and silent reading may be similar in their initial comprehension and if reading ahead could be empirically observed by using eye-tracker.

The study aimed to investigate the three components of sight translation in general and the comprehension component in particular to examine whether the vertical or horizontal perspective was valid. Eye movement indices provided insight to the answer of these research questions.

The results of this study go against the findings of the self-paced reading study conducted by Macizo and Bajo (2004, 2006), whose findings supported the horizontal perspective. The eye-tracking method applied in this study provided the moment-to-moment data to the process of comprehension. First-pass and rereading eye movement indices from reading and sight translation provided robust proof toward the vertical perspective in Chinese to English sight translation. These would not have been observed if the self-paced method was employed.

As far as the linguistic combination Chinese-English is concerned, the results show that comprehension in sight translation does not consume more cognitive efforts than normal silent reading (Huang, 2011). Also, it is hard to say whether the reading ahead phenomenon is the result of interpreter training or something that interpreters are naturally inclined to do.

The findings suggested that sight translation and silent reading were not too different in the beginning. First fixation duration, single fixation duration, gaze duration, fixation probability and refixation probability all reflected the similar nature of the two. Only after fist-pass reading that the two tasks began to differ. As for the phenomenon of reading-ahead, it occurred in 72.8% of cases in the experiment.

With the foundation laid, the current study aims to adopt the eye tracking method to examine the validity of "common" practices in CI note taking. It is hoped that the results of this experiment can provide empirical evidence to either support or challenge the current practices of verticality and the use of target language. It is also

hoped that the results can provide further indications to interpretation training programs to better assist student in note taking. Of course, notes are not the only important thing, yet with limited capacity of working memory, it is vital for all interpreters to have good note-taking skills to help them during interpretation tasks; because “through training, skill-oriented note-taking effort can be enhanced, and as note-taking techniques improve, students’ general CI performances also improve.” (Lee, 2000).

# 3. Research Method

The eye tracking method is non-invasive, and the advancement in technology has made data collection much more efficient. Consequently, the eye tracking method has become popular. Eye movement data are valuable in studying reading and other information processing tasks. During CI, interpreters decipher their notes during production. As interpreters decipher the notes, they have to read and process what they have written down, and simultaneously render interpretation. It is interesting to study the production stage of CI, as there are different tasks (deciphering, conversion, production, and monitoring) being performed simultaneously. Further empirical examination is required to determine whether the recommended principles of note taking are really helpful during this stage, as argued by instructors. Therefore, the current study adopts the eye tracking method to study note-taking techniques in CI.

## 3.1 Research Questions

This chapter will describe in detail the design of the experiment, the materials used, and the subjects that participated. The experiment hopes to find answers to the following research questions:

1) Are vertically written notes really more ideal than horizontally written notes? Will eye-movements reflect this?
2) Are notes written in target language, as much as possible, really more ideal than notes written in source language? Will experiment results validate this principle?

## 3.2 Hypothesis

The practices of vertical notes and the use of target language are thought to better assist interpreters in retrieving messages written down as notes, thus facilitating

speech production. These practices are recommendations made by experienced interpreters based on their personal experience. Interpretation institutes in Taiwan, based on the author's own experience, are preaching these techniques to the students as well. The hypotheses of the current study, thus, are as follows:

1) Vertical notes and target language notes should generate shorter total viewing time (the sum of all fixation durations, please refer to later sections for detailed description) and shorter saccade length, for it is easier to read, allows better preview quality, and that interpreters need less effort in retrieving the stored information.
2) Vertical notes and target language notes should be less likely to cause regression (when the person's eyes move backward to a region that has been previously read), for interpreters should find it less difficult to read and decipher the notes, and that they need not to go backwards to clarify ambiguities.

## 3.3 Participants

Nineteen student subjects are recruited from a pool of interpretation students at Graduate Institute of Translation and Interpretation, National Taiwan University, and Graduate Institute of Translation and Interpretation Studies, Fu Jen Catholic University. All the subjects have passed the entrance exams into the interpretation programs and have received no less than three months of CI training (one semester); therefore, the subjects are relatively familiar with and are capable of performing consecutive interpretation on general topics. All participants are fluent in both English and Mandarin Chinese. All participants have normal or corrected-to-normal vision. Participants are asked to sign an informed consent prior to the experiment, and are aid afterwards.

## 3.4 Experiment Design

There are four passages and four conditions, and the experiment is a 2 (vertical vs. horizontal) by 2 (source vs. target language) design. Participants will perform consecutive interpretation on the four passages in different orders and conditions, and thus there will be four blocks in this experiment. Participants will be asked to answer two comprehension questions after performing interpretation on each block to ensure

that they understand the content. Before the experiment, participants will practice on a shorter passage in advance to familiarize themselves with the upcoming procedures.

Eye-movements of interpreters will be recorded when interpreters perform consecutive interpretation on four passages (selected and edited by the experimenter). The notes of each of the passages are already prepared for the participants, and will be displayed on the monitor. There will be four conditions: vertically written notes/notes written mainly in source-language (VS); vertically written notes/notes written mainly in target-language (VT); horizontally written notes/notes written mainly in source-language (HS); horizontally written notes/notes written mainly in target-language (HT). Different participants will encounter different combinations of the four passages and four conditions.

Eye movement measurements obtained are used to examine the cognitive loads during different conditions; the data will then be compared and analyzed to answer the research questions. After the experiment, all participants will be interviewed on their thoughts regarding the experiment materials and their own performances.

## 3.5 Materials

Materials for the experiment are described in details in the following sections.

### 3.5.1 Speeches

The materials used in this experiment consist of four English speech texts approximately three minutes each in length. The texts are all excerpts from authentic speech texts. The speeches will be recorded by a native English speaker at a rate of 100 to 120 words per minute. In order to eliminate discrepancies in the difficulty level of the materials, all passages will be on general topics in case participants have different levels of familiarity on specific topics. The “readability” ratings will be used in the attempt to control the level of difficulties. Also, after the experiment, the subjects will be asked during the interview to grade the difficulty of the passages on a scale of 1 to 5. This will in turn provide some quantitative indications as to the levels of difficulty of these passages.

The topics of the speeches are: Meetings, Incentives, Conventions and Exhibitions (MICE) in Hong Kong, International Relations—An Australian Perspective, Education Reform, and Digital Publishing. The texts are between 290 to

340 words in length. The practice speech is half the length of the other speeches, and it is a brief introduction to Taiwan's geography.

The Flesch Reading Ease ratings for the four speeches are: 47.2, 51.3, 40.1 and 52.1, which mean that all four pieces are at senior high school level of difficulties. The reading ease rating for Education Reform is relatively lower (harder to read), however, it remains at high school level of readability.

### 3.5.2 Notes

Notes will serve as the visual stimuli in this experiment. Notes will be shown on the monitor during the experiment. Normally speaking, notes are written down by the interpreter while he or she is listening to the speaker. However, since notes are the main focus of this study, and the notes are controlled variables, therefore the notes are fabricated and manipulated by the experimenter in this study.

To ensure such fabricated notes are comprehensible to the subjects, the experimenter has first collected, compared, and analyzed notes from in class practices of first and second year students—the would-be subjects—at GITI and GITIS. Common features of the notes, such as symbols, arrows, abbreviations, and Chinese characters were tabulated. These common features were used, where they are applicable, in the fabricated notes. Other rules, such as combination of symbol and abbreviation, mathematical symbols (such as the equal sign, plus/minus, greater than/less than…etc.), universal logical indicators, such as "∴" (therefore), were also used in the notes.

The two experimenters listened to the speeches and took notes in a style that they were both familiar with; the two sets of notes (vertical) were compared to determine the contents of the speeches that were to be kept in the fabricated notes. The common features were used in places where applicable. A fellow GITIS student that had finished two years of training then piloted the notes. The notes for the four speeches were then scanned onto computer and then manipulated by using Photoshop.

There are six pages of notes for the speech of MICE in Hong Kong; seven pages for the one on International Relations—An Australian Perspective; six pages for Education Reform; and eight pages for Digital Publishing. Notes for each speech are manipulated into four conditions: VS, VT, HS, and HT. There are three pages of notes

for practice speech, and there is only one condition.

### 3.5.3 Comprehension Questions

Each speech has a set of two comprehension questions. The questions are true and false questions testing the participants' understanding of the speeches. The questions are simple and straightforward. By testing the participants' understanding of the speeches, the experimenter can thus eliminate those with less than desirable accuracies, since the notes will contain complete and accurate information for the participants, therefore the comprehension questions will be used to eliminate those trials where the participants fail to fully understand the main ideas of the speeches, and as a result, interpret the speech inaccurately. After all, accuracy is one of the most important criteria of all interpretation performance.

### 3.5.4 Information Sheet

Every participant will have to fill out an information sheet right before the experiment. The information sheet is used to further understand the language background of the participants, which is believed to be a factor affecting the participants' performances. The information sheets will also be a complement to the experiment, providing qualitative information for later analysis.

### 3.5.5 Interview

After the experiment, the experimenter will interview participants based on a questionnaire. There are two parts to the questionnaire; the first half is designed to find out how the participant thinks about CI in general, and the second half aims to explore their experience during the experiment. These will provide qualitative (and quantitative) details of how the participants think about the experiment.

### 3.5.6 Apparatus

Stimuli will be presented on a computer monitor (1024*768 pixels) and eye movements will be recorded using an Eyelink 1000 Desk Mount eye-tracker, manufactured by SR Research. The sampling rate is at 1000 samples per second. Stimuli will be shown in the middle of the screen one page at a time. A forehead rest is equipped for the participants to position their heads during the experiment. The distance from the forehead rest to the monitor was 70 cm.

## 3.6 Procedure

The participants will first fill out a questionnaire form. Before the experiment begins, participants will be tested for their dominant eye, which is going to be the eye recorded during the experiment. Participants will then be seated in a dimly lit room in front of a PC monitor and will be tested individually. At the beginning, instructions will be presented on the screen. The nine-point calibration and validation procedure will then follow to determine the correspondence between pupil position and gaze position. The experiment will be divided into two parts, with a five-to-ten-minute intermission in between. There will be one practice speech and four speeches on different topics. Practice passage allows participants to familiarize themselves with the settings. At the beginning of each trial, participants will be asked to fixate on a cross, which is where the notes will be shown on the monitor. If the eye fixates in an acceptable range, the cross will vanish and the notes will be shown. The calibration and validation process will be performed again if participants fail to accurately fixate on the cross.

The participants will first listen to the audio file of the speech. They do not, unlike authentic CI environment, have to take down any note; they just have to listen carefully. When audio is playing, the screen will display corresponding notes. Participants can use the time to familiarize themselves with the fabricated notes, or simply concentrate on listening and comprehending the speech. When the audio comes to an end, the screen also becomes blank, and the participants will have to fixate on the cross on the top-left corner of the screen, this will ensure the accuracy of the measurements. The notes will appear on the monitor screen again when the participants successfully fixate on the cross. The participants will be given enough time to render their interpretation, that is, approximately as long as the length of the original segment. Recording device will be activated whenever the participant is rendering his or her interpretations. The recording allows examination into the relationship between eye fixations and participants' performances. The participants will press a key to continue onto the next page of the notes until they are finished. At the end, the comprehension questions will appear on the screen. The participants will have to answer the questions (two for each speech) by pressing the keypad near their hand. After the comprehension questions, the steps are the same through out the experiment for all speeches.

### 3.7 Constraints of the Experiment

This experiment attempts to look into CI notes, therefore, in order to best observe the differences between different styles of note taking, all the notes are fabricated by the experimenter, and will be provided to the participants. This contradicts to actual CI situation, as interpreters normally take their own notes when listening. Note taking, in a way, is a process in which interpreters re-organize the obtained information, and will help them to better understand the message of the speaker. On the other hand, since interpreters have to listen and take notes at the same time, they will have to carefully allocate their attentions between the different tasks; this is usually when errors occur.

During this experiment, the participants no longer have to multi-task while they are listening. They simply have to listen carefully to the original message. Although they no longer have to take their own notes, they might not get used to the idea of "reading someone else's notes". After all, note taking is rather intimate to interpreters. Even though the experiment uses "common" features wherever possible, and tries to come up with notes as universal as possible, the fact is that all interpreters have their own way of note-taking, and some of their performances may be affected by the fact that they are "reading off someone else's notes".

However, the interpreters are presented with the opportunity to familiarize themselves with the notes while they are listening to the speeches, as the notes will be displayed on the screen. This hopefully serves as compensation, hoping to help the participants with processing and organizing information.

## 4. Eye Movement Result

### 4.1 Results of Statistical Analysis

After the experiments, all data collected by the eye tracking method are converted into CSV files. These are the Global data. ROIs and Targets are later selected from the Global data by first excluding all fixations outside of the ROIs, and then excluding all fixations outside of target ROIs. R-Project is used for statistical analysis, which is a free software environment for statistical computing and graphics.

All the measurements from each set of data—Global, ROIs, Target—will be first explained and presented in the following sections in the order of Global Results, ROIs

Results, and Target Results.

### 4.1.1 Global Results

For the Global data, the indicators looked at are: TVT, TVT-Forward, TVT-Regression, Mean Saccade Length, Mean Saccade Length Forward (MSL-Forward), Mean Saccade Length Regression (MSL-Regression), Regression Rate, and Target Rate. Statistical analysis is conducted to find the correlation between the factors: Language (Target Language and Source Language) and Direction (the condition of the notes, namely, Vertical and Horizontal). This section will present and discuss the indicators that have achieved statistical significance.

**Table 4.1.1 Global Results**

| Indicator | Direction | Language | Lang. x Dir. |
|---|---|---|---|
| TVT | | | |
| TVT-Forward | Significant | | |
| TVT-Regression | Marginal | | |
| Mean Saccade Length | Significant | | |
| MSL-Forward | Significant | Significant | |
| MSL-Regression | Marginal | | |
| Regression Rate | Significant | | |
| Target Rate | | significant | |

#### 4.1.1.1 Global TVT-Forward

TVT-Forward is the sum of all forward fixations, that is, the total time spent by the subject with their eyes moving forward. This means that the subject needed not to look back, as he or she had no difficulty processing previous information. The subject was able to relocate their attention to new information on the page. Statistical analysis shows that direction is a significant factor affecting TVT-Forward. TVT-Forward for vertical notes is significantly higher than horizontal notes. This means that subjects spent significantly longer time looking at new information, rather than looking back to previous information.

#### 4.1.1.2 Global Mean Saccade Length

Mean Saccade Length is the average saccade length in pixels of a certain page of the notes. Normally in reading, shorter saccade lengths may be caused by reading

difficulties, however in the current study, it is hypothesized vertical notes result in shorter saccade length, for the grouped ideas and messages allow rapid processing; shorter saccade length, in this case, can facilitate faster speech production since no new information is obtained during saccade. Statistical analysis shows that direction is a significant factor. Vertical notes result in shorter mean saccade length, which may indicate that the subjects can access the information written down on the notes at a more rapid speed. It can also mean that the subjects refixate on same region multiple times as they try to process the information.

#### 4.1.1.3 Global MSL-Forward

MSL-Forward is the average length of forward saccades in pixels. The result of statistical analysis shows MSL-Forward achieves significance in both direction and language. Vertical notes and notes written in the target language both result in shorter MSL-Forward. Again, this may be the result of multiple refixations within a region, or the fact that the format of the notes featuring grouped ideas and messages allows the subject to quickly move to the next new piece of information.

#### 4.1.1.4 Global Regression Rate

Regression Rate is the probability of the subject looking back to previous information written on the notes. Regression means that the subject needed to look back to previous information they had already read. Statistical analysis shows that direction is a significant factor affecting Regression Rate. Regression Rate in horizontal notes is significantly higher than that of vertical notes.

#### 4.1.1.5 Global Target Rate

Target Rate refers to the probability of the subject fixating on the Targets (the target ROIs where language is being manipulated). Lower target rate means high skipping rate, which is an indication of high preview rate and better preview quality. This shows that the reader or the subject experience relative ease when processing the information in the area, that they are able to process the idea during the preview stage and thus requiring fewer fixations within the area. Global Target Rate achieves significance in language. Words written in the target language required fewer fixations.

### 4.1.2 ROIs Results

The ROIs data, as described before, is the part of Global data excluding all fixations outside of the ROIs. Thus, this set of data still reflects the global eye movements. For the ROIs data, the indicators looked at are: TVT, TVT-Forward, TVT-Regression, Mean Saccade Length, Mean Saccade Length Forward (MSL-Forward), Mean Saccade Length Regression (MSL-Regression), Regression Rate, First Fixation Duration (FFD), Gaze Duration (GD), Rereading Time (RRT) and Latency. Statistical analysis is conducted to find the correlation between the factors: Language (Target Language and Source Language) and Direction (the condition of the notes, namely, Vertical and Horizontal). This section will present and discuss the indicators that have achieved statistical significance.

**Table 4.1.2 ROI Results**

| Indicator | Direction | Language | Lang. x Dir. |
|---|---|---|---|
| TVT | Marginal | | |
| TVT-Forward | Marginal | | |
| TVT-Regression | Marginal | | |
| Mean Saccade Length | Significant | | |
| MSL-Forward | Significant | | |
| MSL-Regression | | | |
| Regression Rate | Significant | | |
| FFD | | | |
| GD | | | |
| RRT | Significant | | |

#### 4.1.2.1 ROIs Mean Saccade Length

ROIs Mean Saccade Length is the average saccade length in pixels. Statistical analysis shows that direction is a significant factor. Vertical notes result in shorter ROIs mean saccade length, which may indicate that the subjects can access the information written down on the notes at a more rapid speed. It can also mean that the subjects refixate on the same ROI multiple times as they try to process the information.

#### 4.1.2.1 ROIs MSL-Forward

ROIs MSL-Forward is the average length of forward saccades in pixels. The result of statistical analysis shows ROIs MSL-Forward achieves significance in direction. Vertical notes result in shorter ROIs MSL-Forward. Again, this may be the result of multiple refixations within the same ROI, or the fact that the format of the notes featuring grouped ideas and messages allows the subject to quickly move to the next ROI.

#### 4.1.2.3 ROIs Regression Rate

ROIs Regression Rate is the probability of the subject looking back to previous ROIs that they have already read. Statistical analysis shows that direction is a significant factor affecting ROIs Regression Rate. Regression Rate in horizontal notes is significantly higher than that of vertical notes.

#### 4.1.2.4 ROIs RRT

Rereading time is the total of all fixation durations after the first pass. Rereading Time reflects the time needed for the subject to go back to previously read ROIs, reflecting the cognitive processes of trying to figure out the links between the ideas and messages. Statistical analysis shows significance in direction, with vertical notes requiring shorter RRT.

### 4.1.3 Targets Results

The Targets data, as described before, excludes all fixations outside of the target ROIs. This set of data focuses sole on target ROIs, which are where the words are being manipulated (written in either Chinese of English, the target language and source language). Each page features a different number of targets, which are chronically numbered. For the Targets data, the indicators looked at are: TVT, TVT-Forward, TVT-Regression, Mean Saccade Length, Mean Saccade Length Forward (MSL-Forward), Mean Saccade Length Regression (MSL-Regression), Regression Rate, Target Rate, First Fixation Duration (FFD), Gaze Duration (GD), and Rereading Time (RRT). Statistical analysis is conducted to find the correlation between the factors: Language (Target Language and Source Language) and Direction (the condition of the notes, namely, Vertical and Horizontal). This section will present and discuss the indicators that have achieved statistical significance.

**Table 4.1.3 Targets Results**

| Indicator | Direction | Language | Lang. x Dir. |
|---|---|---|---|
| Blinking Rate | | | Significant |
| TVT | | Significant | |
| TVT-Forward | | Significant | |
| TVT-Regression | Marginal | Significant | |
| MFD | | | |
| Mean Saccade Length | Significant | Significant | |
| MSL-Forward | Significant | | |
| MSL-Regression | | | |
| Regression Rate | Significant | | |
| FFD | | | |
| GD | Marginal | | |

#### 4.1.3.1 Targets TVT

Targets TVT refers to the sum of all fixations on the target ROIs. Statistical analysis of Targets TVT shows significance in language. Total time spent on viewing source language words is significantly longer than on target language words.

#### 4.1.3.2 ROIs TVT-Forward

Statistical analysis shows significance in language. Targets TVT-Forward for source language words is higher. This means that subjects spent longer time looking forward to source language words.

#### 4.1.3.3 Targets TVT-Regression

Targets TVT-Regression is the total time the subject spent looking back to a target ROI. Statistical analysis shows significance in language and marginal significance in direction. Targets TVT-Regression is higher in source language notes, and in horizontal notes.

#### 4.1.3.4 Targets Mean Saccade Length

Targets Mean Saccade Length is the average saccade length in pixels. Statistical analysis shows that direction and language are both significant factors. Vertical notes and target language notes result in shorter Targets Mean Saccade Length, which may

indicate that the subjects can access the information written down on the notes at a more rapid speed.

#### 4.1.3.5 Targets MSL-Forward

Targets MSL-Forward is the average length of forward saccades in pixels. The result of statistical analysis shows Targets MSL-Forward achieves significance in direction. Vertical notes result in shorter Targets MSL-Forward. This may be the result of multiple refixations within the same target ROI.

#### 4.1.3.6 Targets Regression Rate

Targets Regression Rate is the probability of the subject's eye moving out of the target ROI from the left. Statistical analysis shows that direction is a significant factor affecting Targets Regression Rate. Regression Rate in horizontal notes is significantly higher than that of vertical notes.

## 4.2 Analysis

Results from the Global data and ROIs data mainly deal with the issue of direction; while results from the Targets data are more specifically addressing the issue of language. This section will look at the results from the three sets of data, specifically the TVT, Regression Rate, TVT-Regression, and Mean Saccade Length results from all three sets of data, as well as Target Rate and RRT results from ROIs data, and some additional measurements that have achieved marginal significance.

### 4.2.1 TVT's

TVT is the sum of all fixation durations, which shows the total time required to process the information contained in the notes (or more precisely, in a page of the notes). Global TVT achieved no significance, however, it shows that all subjects performed CI interpretations within the time limits. Even though Global TVT does not indicate the validities of vertical note taking and the use of target language, it serves as a reference for the analysis of Global TVT-Regression.

As for ROIs TVT, statistical analysis shows marginal significance in direction, indicating that vertical notes may in fact facilitate better processing of information, hence the shorter total viewing time spent on the ROIs. Although this is not enough to

validate the convention of verticality, it does imply the possibility that vertical notes are easier to read/decipher, and thus in theory will help interpreters during speech production.

On the other hand, as mentioned before, the results of the Targets data mainly address the issue of language, and statistical analysis of Targets TVT shows significance in language factor. This means that subjects spent less time on words written in the target language, empirically showing that subjects need less time for production when the word is written in the target language—that is, no need to convert the word in their head.

### 4.2.2 Regression Rate

Regression Rate is one major indicator to be looked at in the current study. Regression Rate indicates that subjects experienced difficulties in finding the logical links between the ideas written in the notes, or that they had to return to previously read information for further processing. Regression Rates from all three sets of data show significance in the factor of direction, once again proving that vertical notes can better facilitate speech production during CI. This indicates that the interpreters need not to look back, as much, to previous notes as they are rendering the interpretation, and that they can move forward with fewer interruptions.

### 4.2.3 TVT-Regression

TVT-Regression indicates how much time the subjects needed to look backward to old information for further processing. This may be the result of subjects encountering difficulties or missing information that they needed for speech production. Subjects had to look back for more information or missing logical links. Shorter TVT-Regression indicates that subjects find it relatively easy to decipher the notes, and they do not need to regress.

For the Global data, TVT-Regression only achieved marginal significance. However, due to the fact that Global TVT is relatively constant (all interpretations needed to be under three minutes) and that Global TVT-Forward achieved significance, it can be deduced that direction is a major factor affecting the duration of TVT-Regression. This means that for vertical notes, subjects spent less time look backwards at old information, therefore showing that they have less difficulties

deciphering vertical notes.

Targets TVT-Regression and ROIs TVT-Regression also achieved marginal significance in direction. This might be an indication that vertical notes are easier to read and interpreters can quickly access the information without looking backward to old information. Even though TVT-Regression only achieved marginal significance, yet it further illustrates that vertically written notes may just be a better aid for interpreters.

### 4.2.4 Mean Saccade Length

During reading, shorter saccade length may represent reading difficulty, however, shorter saccade length may also mean refixations on the same region. Longer saccade length may be the result of high skipping rate, revealing that the information was processed during the preview stage, and therefore no fixations landed on the region.

For Global Mean Saccade Length, statistical analysis shows that direction is a significant factor affecting the average saccade length. Mean Saccade Length is shorter in vertical notes. One possible cause for shorter saccade length may be that the distance between lines of notes are relatively shorter than the distance between words written next to each other. Another possible explanation for shorter saccade length in vertical notes is that the ideas are grouped closer together; therefore the subject can move onto the next piece of information more quickly.

Statistical analysis of ROIs Mean Saccade Length also shows significance in direction. Again, this may be the result of the two aforementioned causes. As for Targets Mean Saccade Length, both direction and language are significant factors. Saccade length is longer in horizontal notes and in source language notes. The Targets data only includes the fixations on target ROI's; therefore, with longer saccade length in source language notes, it means that saccades in or out of the target ROI are longer. One possible cause for this is that the subject's eye needed to travel further to access the information. Combined with higher Regression Rate, it can be said that the subject returned from later parts of the notes to reprocess previous target ROI's more often, and that his or her eyes travelled a longer distance in order to do so.

### 4.2.5 ROIs RRT

RRT is the time the subject spent rereading the notes after the first pass. Higher

RRT means that the subject needed to always look backward, reflecting that the notes caused more difficulties. Statistical analysis of ROIs RRT shows significance in direction. Again, horizontal notes require longer RRT. This shows that the subject's eye moves back and forth more often when reading horizontal notes than when reading vertical notes. Also, as the subject spends more time reading back, it means that he or she is not receiving new information; for an interpreter, it means that he or she needs to look back and process older information, and that the speech production may be affected.

Therefore, the findings of the study indicate that the common practices of vertical notes and target language notes do serve as ideal aids for interpreters during CI. The eye tracking measurements show that direction and language are both significant factors affecting fixation durations and probability of regression.

# 5. General Discussion

The present study attempts to find empirical evidences to support the common practices of verticality and the use of target language in CI note-taking. The study examines the different formats of notes through eye tracking measurements. The eye tracking indicators achieving significance statistically—TVT, MSL, Regression Rate…etc—show that the cognitive loads experienced by the interpreter during note deciphering are less in vertical and target language notes. Therefore, in theory, the interpreter has more energy to focus on recalling information stored in short-term memory and monitoring their speech (implementation of speech plan).

## 5.1 The Guideline of Verticality for CI Note-Taking

Through training, note-taking skills can be enhanced (Lee, 2000). Students can still develop their own system, however, for beginners, it is most effective if instructors can provide them an easy and simple guideline. Now with empirical evidence supporting the validity of verticalization, students can build their own system on top of this proven foundation. From the interview results, it is also obvious that student interpreters find vertical notes easier to decipher, and student interpreters are also, to different extents, practicing this recommendation by Rozan.

## 5.2 The Use of Target Language

Unlike verticality, the use of target language is the topic of many debates.

Supporters of using target language for note taking believe that it allows the interpreter to depart from the surface of the word, and makes them grasp the essence of the main message underneath the word. By taking notes in target language, the interpreters are forced to process the idea prior to have it written down. Therefore by the time for interpreters to render the interpretation, it is time saving and facilitates production in the target language (Dai and Xu, 2007).

On the other hand, those who are against using target language for note taking believe that it adds to the cognitive load during the listening and comprehending stage. Interview results reveal a trend consistent to the observations of Seleskovich, Kirchhoff and Andres, that there is a mixture of source and target language. According to the subjects, they simple chose the easier thing to write down in order to save time and effort.

Dam (2004) mentioned that the governing factor for the choice of language is mainly the status of the language in the interpreters' language combination. However, the tasks in Dam's study are consecutive interpretation from Danish to Spanish and from Spanish to Danish. In the current study, the language combination involved is Chinese and English. Chinese is fundamentally a different language system compared to English, French, Spanish, or even Danish. The Chinese characters are unlike any other written language in the world, and therefore may be a major factor affecting the choice of language for interpreters' notes. As mentioned by the subjects, that they find it hard to write Chinese characters at times, and they prefer writing English words simply because it is more efficient during note-taking.

The results obtained from the eye tracking method, on the other hand, deals with the production stage of CI. The results of statistical analysis show that by writing in target language, it reduces the effort the interpreter needs to decipher the notes. The words written in target language allow the interpreters to better preview the information, and therefore facilitate speech production better.

Therefore, even though using target language may reduce cognitive load during the production stage, it is undetermined, at least this experiment did not address the issue, that if it will cause greater cognitive load during the listening and comprehension, and information retention stages of CI note taking.

## 5.3 Implications to CI Training

Verticality and shift (or indention), or diagonal notes, or any other name that the system can be called, emphasizes the organization of ideas in a logical way, which gives way to the links between the ideas and messages that are vital for interpreters to render accurate interpretations. Empirical evidences show that vertical notes are in fact more efficient and effective during speech production, but training institutions should really focus on training students on how to group ideas, grasp ideas rather than writing down anything that comes into their ears, and listen and comprehend the information before they write it down.

Notes, as important as it may be, are after all, an aid. Complete notes do not necessary lead to quality interpretation. Therefore, students should learn how to process what they hear, grasp the important elements of the information, such as logical links, the main ideas, the essence of the message, and write them down vertically.

On the other hand, using target language does save time during speech production, however, if the students struggle to convert the words into target language during note taking, they will also fail to listen simultaneously to the speech. Therefore, students should be reminded that target language could be an effective technique, but only when they have the capacity to do so during the first two stages of consecutive interpretation.

# 6. Conclusion

The present study is one of the pioneering studies that investigated the common practices of CI note taking by adopting the eye tracking method. The eye tracking method is proven to be an effective technique in observing and analyzing moment-to-moment cognitive processes during consecutive interpretation. The results show that the conventions in CI note taking—verticality and the use of target language—are in fact valid recommendations not just proven by years of experience but also by empirical evidences.

Although the present study is only a beginning, yet it opens new windows for interpretation researchers in the area of consecutive interpretation, and CI note taking. Researchers in the field of cognitive psychology have already ventured into the field

of interpretation and conducted some studies regarding interpretation. However, it is vital for researchers to design interesting experiments to take full advantage of the eye tracking method. Therefore, researchers in the field of interpretation studies are strongly encouraged to step out of their comfort zone, and adopt the eye tracking method to explore new possibilities in the field of interpretation studies.

The results of this study, hopefully, can help shed light on CI note-taking training. It is hoped that students will no longer need to waste time in figuring out a better way to note, but rather are provided with simple guidelines as foundations on which they can finally develop a personal system that works for them. After all, what really counts in interpretation is the final speech production; perfect notes mean nothing if the rendered interpretation is of poor quality. Notes are, albeit an important and vital one, merely a crutch that helps overcome memory's shortcomings.

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