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Study on Energy Allocation of Sign Language Interpreters in Political Meetings under Gile's Effort Model

Qi Duo

School of Foreign Languages, Inner Mongolia University, Hohhot, 010021, China
18339528852@163.com

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Abstract: On January 21, 2024, the Opening Ceremony of the Second Session and the First Session of the Sixth Chongqing National People's Congress opened. The mayor, Hu Henghua, presented a report on the conference. For the first time, the conference was broadcast in Sign Language, enabling the deaf people to listen to it and to feel the care and attention given by the state to the deaf community as well as inner satisfaction. According to Gile's Effort Model, simultaneous interpreting activities can be decomposed into four parts: Listening and Analysis, Short-term Memory, Production, and Coordination, which aim to help interpreters allocate their energy in the actual interpreting process. Based on Gile's Effort Model, this study uses the case study approach to explore how sign language interpreters allocate their energy to interpretation. The study reveals that sign language interpreters encounter many challenges during consecutive interpreting at political conferences. Therefore, the interpreters must make adequate preparation before interpretation, including choosing appropriate costumes, practicing facial expressions and gestures, familiarizing themselves with political terminology, and keeping abreast of the latest developments in national politics, to avoid the uneven distribution of energy during the interpretation process and to ensure that they can complete the interpretation task efficiently.

1. Introduction

In China, there are only a few studies on sign language interpreting and even fewer studies on sign language interpreting from the perspective of Gile's Effort Model. The purpose of this study is to analyze how sign language interpreters should make preparations before interpreting and in interpreting from the perspective of Gile's Effort Model, so as to reduce the cognitive load, ensure a balanced distribution of energy during Simultaneous Interpreting, and complete the interpreting task efficiently.

One of the highlights of the Second Session of the Sixth Chongqing Municipal People's Congress was the adoption of sign language broadcasting for the first time, which enabled the deaf people to "listen" to the two sessions for the first time, and deeply feel the care and attention of the state to the deaf community, as well as their deep satisfaction and joy. Chinese politics is closely

linked to the lives of its citizens, and it is a fundamental right of every Chinese citizen to keep abreast of national political developments.

Sign language interpreting is somewhat different from interpreting, as in simultaneous or consecutive interpreting, the interpreter uses sound as the medium of information, while sign language uses movement to convey information. However, as early as 1990, Frishberg studied and analyzed sign language activities as sign language interpreting[1]; the field of teaching sign language interpreting has traditionally been more closely associated with the sign language research community than with the teaching community of interpreters and translators. Nonetheless, sign language has been included as a working language among the working languages offered in CIUTI-type T/I programs. Therefore, this study argues that sign language interpreting can be studied within the context of interpreting.

2. Literature Review

2.1 Research Background of Sign Language Interpreting

In recent years, as an essential part of interpreting, more and more scholars and researchers have focused their attention on sign language interpreting research. At present, sign language interpreting research at home and abroad mainly focuses on four aspects: the study of machine sign language under digitalization, the study of sign language interpreting strategies from a multi-modal perspective, the study of some kind of model of sign language interpreting, and the role and influence of sign language interpreting in the English language education of the deaf students.

2.2 Current Research Status of Sign Language Interpretation Both Domestically and Internationally

The rapid development of science and technology has brought many innovative tools and platforms to the field of sign language interpreting, which have significantly improved the efficiency of interpreting and promoted its popularity. For example, the continuous advancement of artificial intelligence and machine learning technology, with the help of computer vision and natural language processing technology, realizes the conversion between sign language and text or speech, which in turn assists deaf people to better integrate into society and significantly improves their quality of life. According to Hong et al, they explored the sign language digital human products developed by Smart Spectrum AI, Tencent, and Huawei, and analyzed the major sign language digital human technology paths and intelligent applications in China, providing cutting-edge research results and reports on the development of scientific and technological applications in the field of sign language in China[2].

As a natural language with rich visual information, sign language expresses linguistic concepts through a combination of multi-modal features such as gestures, expressions, and movements. Multi-modality refers to the intuitive visual access to information through videos and images, which coincides with sign language features. According to Yan et al, they create a multi-modal corpus of sign language suitable for sign language language research by extracting and organizing the knowledge embedded in multi-modal sign language resources, completing the multi-modal annotation of more than 10,000 sign language words, and realizing the whole process of constructing a multi-modal corpus[3]. With the improvement of people's quality of life, people's requirements in education are getting higher and higher, especially the education of children. Che believes that composite talents should be cultivated, and interpreting students can learn sign language interpreting to enhance their competitiveness and adapt to the development of the times [4].

2.3 The specificity of This Study

The Gile's Effort Model, as the theoretical basis for studying interpreting, has also been explored in the field of sign language interpreting. However, most of the existing research focuses on the energy allocation strategies of sign language interpreters in the process of interpreting, and relatively little research has been done on the methods and strategies of interpretation preparation of interpreters.

3. Theoretical Framework

3.1 Sign Language Interpreting

Pöchhacker in *Introducing Interpreting Studies* states that interpreting into an incoming language is sometimes regarded as sound-to-sign language, sign language-to-sign language, or text-to-sign language interpreting. Interpretation can be categorized as either consecutive or simultaneous. Simultaneous interpreting contains five different forms. Sign language interpreting can be subdivided into voice-to-sign language, sign language-to-sound, sign language-to-sign language and text-to-sign language. In simultaneous interpreting mode, voice-to-sign, sign-to-sign or text-to-sign interpreting is feasible without special equipment, while sign-to-sound interpreting can be performed with or without a microphone and a simultaneous booth. In text-to-sign interpreting, the interpreter may need to consecutive between reception (reading the text) and output (performing the sign language), which makes sign language interpreting more akin to a transient consecutive interpreting mode[5].

In summary, each of the four types of sign language interpreting belongs to which type of interpreting is shown in Table 1.

Table 1: Types of interpreting of the four sign language interpreting

sign language interpreting	Sound to Sign Language	Sign Language to Sound	Sign Language to Sign Language	Text to Sign Language
Study viable types	Simultaneous Interpreting	Simultaneous Interpreting	Simultaneous Interpreting	(Brief) Consecutive Interpreting

From Table 1, it can be seen that sound to sign language belongs to simultaneous interpreting, so this study narrows down the scope to the study of sign language interpreting in simultaneous interpreting.

3.2 Gile's Effort Model

In the field of interpreting research, a focal topic that has received much attention is the cognitive load theory. The core concept of this theory in interpreting research is that an interpreter's brain and energy resources are limited when performing interpreting activities, which means that an interpreter can only process and perform a limited amount of information and tasks within a specific period. To gain a deeper understanding of the psychological mechanisms involved in the interpreting process and to explore how interpreters allocate their energy and attention during the interpreting process, interpreting scholars have proposed a variety of models to explain this complex phenomenon. These models enable a better understanding of the cognitive challenges in the interpreting process and provide interpreters with more effective training methods and strategies to improve their interpreting quality and efficiency[6].

To enhance interpreters' interpreting quality and efficiency in practical work, researchers have been exploring and developing more effective training methods and strategies. In the seventies, models based on the information processing paradigm were developed, and these models provided new perspectives for understanding mental activities in the interpreting process[7].

Subsequently, Daniel Gile, a prominent interpreting researcher, drew on information processing models and introduced the concept of cognitive load to the field of interpreting. He developed Gile's Effort Model to describe in detail the key aspects of the interpreting process such as listening and analysis, output and memory. Gile further proposed that the interpreting process can be divided into four basic components: listening and analysis, note-taking, short-term memory and coordination. These components are included in his effort model [8]. Gile's Effort Model emphasizes the interaction and coordination between the components of the interpreting process.

Professional interpreters can make errors when interpreting and these errors are often due to inappropriate allocation of attention and cognitive resources. Gile's Effort Models explain this phenomenon and provide interpreters with theoretical support for improving their methods and increasing their efficiency. These models help interpreters manage cognitive resources effectively in high-intensity environments, reduce errors, and improve interpretation quality.

4. Difficulties and Challenges of Sign Language Simultaneous Interpretation in This Conference

4.1 Special Target Group, Strict Sign Language Standards

This study reveals that in the live feed of the opening ceremony of the conference, the speakers occupied most of the screen space and were in the center; while the sign language interpreters were placed in the lower left corner of the screen, occupying only a very small area, which is a common layout in sign language broadcasting and hosting programmes[9]. The focus of the television report was naturally on the part that occupied a larger area of the screen. Given that sign language interpreters play a crucial role for deaf people to understand the content of the conference, their preparation in terms of clothing, gestures, position, and facial expressions needs to be improved.

In this meeting, the interpreters wore dark red suit jackets with black shirts underneath, and their hair was neatly coiled in a bun at the back of their heads, giving them an overall appearance of simplicity but professionalism and rigor. Their plain and unobtrusive make-up helped the deaf people to focus on the interpreter's gestures, while the dark-colored clothing created a comfortable and introspective atmosphere for the interpreters, which helped to alleviate the psychological pressure during the interpretation process.

In the study, by carefully observing the footage of a live conference broadcast over one hour and twenty-two minutes, this study revealed the precise range of the interpreters' gestures when they were performing sign language interpreting. As shown in Figure 1, the interpreters' sign language gestures did not exceed the corners of their mouths at the highest level and did not fall below the abdomen at the lowest level, while most of the gestures were performed in the chest region. This use of gestures helps to make the linguistic information conveyed clearer and more intuitive. The interpreter maintains an upright posture and avoids any unnecessary small movements throughout the interpretation process, except for the necessary signing gestures. This not only reduces possible language comprehension bias by the audience, but also fits in with the solemn atmosphere of the meeting.

Therefore, when carrying out pre-interpretation preparations, interpreters need to pay attention to the above code of conduct and dress code to meet the expectations of target language speakers.

Figure 1: The Conference Sign Language Broadcaster Gesture Height from Low to High

4.2 Emerging Political Terminology, Good Knowledge Reserve

According to a report on the Chongqing NPC website on 22 January 2024[10], Xiaojuan, Yang, the interpreter in charge of sign language broadcasting, was interviewed by a reporter and mentioned that she had started to take out the 2023 Government Work Report for sign language practice two weeks before the opening of the Congress. She also mentioned that the precise and rigorous wording of the government work report posed a challenge for the interpreting activity, especially some professional terms, such as "YuYue Action" and "San Gong Jian Yi Pan Huo", etc. Since there was no official reference, she tried to translate them more accurately. To translate more accurately, Xiaojuan, Yang looked up information, consulted her deaf friends, and practiced over and over again.

This study found that as a sign language interpreter, during the pre-interpretation preparation period, one should fully prepare for the various professional terms and current affairs buzzwords that may appear in the interpreting scene, and endeavor to understand the hidden meanings behind these complex words, to be able to convey the information more accurately and to reduce the cognitive load in the process of interpreting. It is only through such preparations that we can ensure that the sign language broadcasting can be carried out smoothly during the Congress so that even the deaf people can fully understand the content of the Government’s work report.

4.3 Common Digital Reports, good practice before long-term interpretation

At the opening ceremony of this conference, Hu Henghua submitted a government work report to the conference on safeguarding people's livelihoods, promoting their well-being, and solving their problems. In the report, figures appear frequently as a symbol of objectivity, truthfulness, and accuracy. Therefore, sign language interpreters must be familiar with numbers ranging from single digits to ten thousand digits and even billions of digits. The example containing large numbers is shown in Table 2.

Table 2: Example sentences in Chinese, English versions

Chinese	Shu Zi Jing Ji Kuai Su Cheng Zhang, Suan Li Gui Mo Chao Guo 1,000, Xin Jian 17 Ge Zhi Neng Gong Chang 224 Ge Shu Zi Hua Che Jian.
English	The digital economy has grown rapidly, with computing power exceeding 1,000 batches, 17 smart factories, and 224 digital workshops.

According to Table 2, in the case of the opening speech of this conference mentioned above, a variety of numerical expressions are involved, including fractions, percentages, decimals and large values, and the units of measurement corresponding to these numbers are different. Numeric interpreting requires interpreters to practice continuously in the course of ongoing pre-interpretation preparation to reach a level of proficiency to be able to cope with consecutive numeric interpreting tasks during on-site interpreting. In addition, given the political nature of the conference, it is vital to ensure that the digital message is accurately delivered to the deaf people, and therefore sign language interpreting cannot be compromised. This also means that sign language interpreters must practice diligently before interpreting to reduce the amount of effort required to understand and analyze the message (L/A) and the output of the message (P) during simultaneous interpreting.

4.4 Complex Vocabulary Frequency, Good use of Superior Words

The Chongqing NPC website also mentions that when Xiaojuan Yang heard a complex word in a sentence, she quickly translated the vocabulary processing into more understandable superior words. Table 3 shows an example containing large numbers.

Table 3: Example Sentence in Chinese, English and sign language versions

Chinese	Yao Jia Qiang Zhong Dian Ling Yu, Xin Xing Ling Yu Chuang Zhi Xing Li Fa.
English	We will strengthen creative legislation in key areas and emerging areas.
Sign Language Translation	Chuang Zao Xing Kai Zhan Li Fa Gong Zuo.

The key word in the original text is "Chuang Zhi", and the scope is key and emerging areas. The word is not included in the *Dictionary of National Common Sign Language*[11], while "Chuang Zao" has a specific sign language interpretation in the Dictionary of National Common Sign Language. The first word itself means to establish new regulations or systems to achieve political order; the second word means to come up with new methods and to establish new theories. The two words are essentially synonyms, so when it is impossible or difficult to translate the source words, replacing them with simpler and more colloquial superlative words will not only allow deaf people to understand the meaning of the original sentence faster and more clearly when they watch the live broadcast, but also reduce the need for the sign language interpreter to translate the production (P) of the activity. The present study shows that the sign language interpreter's energy consumption in the process of interpreting the production (P) of the activity is reduced.

This study points out that when interpreting in sign language, it is inevitable to encounter some words that have not yet been formally compiled into sign language dictionaries. These vocabularies are usually popular terms that are circulated only within specific communities and have a relatively limited reach compared to terms that are widely recognized by the public. This phenomenon creates significant barriers and challenges for deaf people to understand these emerging words. Therefore, when performing simultaneous interpretation, due to its immediacy and time pressure, sign language interpreters are unable to immediately check the official definition of a particular new term, and therefore suggest that simpler or more widely known terms be used as substitutes in the interpretation process.

4.5 The Increased Cognitive Load, Good Synchronization of Sign Language

Sign language interpreting is a code-switching process involving two different vectors, auditory and visual [12]. Within the framework of Gile's Effort Model, sign language interpreters first need to activate their visual and auditory senses to capture and receive the linguistic information conveyed

by the speaker. Subsequently, the interpreter must comprehend, remember and further process this information in the brain for processing. This process involves in-depth analysis and integration of the linguistic information to ensure its accuracy and completeness. It is only after the information is fully understood and processed that the interpreter can convert the processed information into the target language, i.e. sign language, to communicate to the deaf people. This conversion process requires not only a high level of concentration and memory, but also excellent linguistic comprehension and expression, as well as a good command of two different language systems.

In this conference, the sign language interpreter's job is not only to convert the language into sign language, but also to synchronize their lips. This additional work of lip-synchronization undoubtedly increased the cognitive load and energy consumption of the interpreters. In the process of interpreting, sign language interpreters not only use hand movements to express language, but also synchronize the lips' speech, which undoubtedly puts higher demands on their brain and hand movements. According to Zhang[13], fluent language expression can make hand gestures more natural and fluent. Therefore, in the process of interpretation, lip-sync, as a special "language", should also try to maintain its fluency. To achieve this goal, interpreters need to find a balance between the speed of speech and the speed of gestures and try to maintain the consistency between the two, so as to reduce the energy and cognitive load consumed in reorganizing speech and gestures in the process of interpreting. However, it is not easy to achieve such a balance, and it requires translators to do a lot of preparatory work and practice before interpretation to ensure that they can cope with various challenges in the actual interpretation process and ensure the accuracy and fluency of interpretation.

5. Translation Strategies for Sign Language Interpretation in Major Conferences and Meetings

In order to effectively deal with these challenges, the researchers have thoroughly explored the various difficulties and challenges faced in the process of sign language interpreting, and have proposed a series of corresponding interpreting strategies on this basis.

5.1 Interpreters Preparing Clothing, Signing and Emotion

Before carrying out an interpreting job, the interpreter must make adequate preparations to ensure that the message is conveyed accurately and correctly in all situations. This includes carefully selecting appropriate clothing to suit the occasion and the audience. In addition, translators need to determine appropriate gesture positions and expressions to better assist language expression during translation. Gestures can enhance the infectiousness of the language and help the audience better understand the message. Interpreters should adjust their facial expressions according to the emotional color of the translated content, so as to make them match the language content.

5.2 Interpreters Reserving Professional Knowledge

The interpreter must have an in-depth understanding and familiarity with the relevant political terms and materials before carrying out the translation work. This includes not only a mastery of specialized vocabulary, but also an understanding of relevant background knowledge. To achieve this goal, translators need to accumulate the necessary knowledge reserves by consulting political reports, policy documents and other relevant materials from previous years. In addition, it is also essential to carry out a lot of translation practice.

5.3 Interpreters Practising Digital Interpreting

In addition, interpreters need to carry out long-term pre-interpretation preparation, especially specialized sign language practice for numerical interpreting. This step is crucial because it can help the interpreter better master the expressions of numbers, thus improving the accuracy and fluency of the translation. Through repeated practice, interpreters can familiarize themselves with sign language expressions for various numbers, ensuring that they can convey the message quickly and accurately in the actual translation process. Such specialized practice not only helps to improve the professional skills of the interpreters, but also enhances their self-confidence in the actual work, thus ensuring stable and reliable translation quality.

5.4 Interpreters Simplifying Complex Terminology

Interpreters should also pay special attention to complex and difficult-to-understand terms and emerging vocabulary. To ensure that the message is accurately conveyed and understood by the audience, interpreters need to simplify these terms and new words and use more plain and easy-to-understand sign language.

5.5 Interpreters Maintaining A Good Mindset

Interpreters should endeavor to maintain a relatively stable speech speed when carrying out their interpreting activities, which can ensure the fluency and coherence of sign language. A steady rate of speech helps the interpreter to better control his/her pace during the interpreting process, thereby reducing psychological pressure and tension.

6. Conclusions

Within the framework of Gile's Effort Model, this study delves into the challenges of energy allocation faced by sign language interpreters in pre-interpretation preparation and the four main parts of the interpretation activity. By analyzing these segments in detail, the study reveals several challenges encountered in sign language interpreting. These challenges include but are not limited to, the frequent occurrence of figures, the novelty and complexity of specialized political terminology, the diverse needs of the deaf people, the high level of accuracy demanded of the interpreter's output, and the greater cognitive load that sign language interpreters have to bear as compared to ordinary interpreters.

There are some limitations in this study, which are mainly reflected in the limitation of the scope of the study. Specifically, the focus of the study was limited to the pre-interpretation preparation stage and several major aspects of the interpretation process, while failing to delve into other important aspects of interpretation. In addition, the selection of research examples is not specific and detailed enough, mainly because this study is not deep and comprehensive enough in terms of sign language-related knowledge. Due to the limited understanding and mastery of sign language, the study fails to fully demonstrate the complexity and diversity of sign language interpreting, resulting in the findings appearing insufficiently specific and detailed in some aspects. Future research needs to further expand the scope of the study, add more examples to be analyzed, and conduct more in-depth research on the various aspects of sign language interpreting to make up for the shortcomings of this study.

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