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COGNITIVE FEATURES OF LANGUAGE INTERFERENCE IN SIMULTANEOUS INTERPRETING

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This article examines the cognitive features of language interference in the process of simultaneous interpreting. It analyses the main categories of interference, such as phonological, lexical, syntactic and semantic, as well as the cognitive strategies used by interpreters to minimise its impact. Using cognitive load theory and the inhibitory control model, the study shows how translators manage their working memory and attention resources during real-time translation. It also highlights cultural interference and the role of neuroscientific approaches, such as functional magnetic resonance imaging (fMRI) and evoked potentials (ERPs), in understanding the neural basis of interference. The article contributes to the development of effective methods for training interpreters to improve their accuracy and productivity, and analyses methods and strategies for minimising interference in simultaneous interpreting.

Key words: *Simultaneous interpreting, language interference, cognitive load, bilingualism, inhibitory control, phonological interference, syntactic interference, semantic interference, memory strategies, neuroimaging techniques*

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КОГНІТИВНІ ОСОБЛИВОСТІ МОВНОЇ ІНТЕРФЕРЕНЦІЇ В СИНХРОННОМУ ПЕРЕКЛАДІ

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У цій статті розглядаються когнітивні особливості мовної інтерференції у процесі синхронного перекладу. Проаналізовано основні категорії інтерференції, такі як фонологічна, лексична, синтаксична та семантична, а також когнітивні стратегії, що застосовуються перекладачами для мінімізації її впливу. Використовуючи теорію когнітивного навантаження та модель гальмівного контролю, дослідження показує, як перекладачі управляють своїми ресурсами робочої пам'яті та уваги під час перекладу в реальному часі. Висвітлено також культурологічну інтерференцію та роль нейронаукових підходів, таких як функціональна магнітно-резонансна томографія (fMRI) та викликані потенціали (ERP), для розуміння нейронної основи інтерференції. Стаття робить внесок у розвиток ефективних методів підготовки перекладачів для покращення їх точності та продуктивності, аналізує методи та стратегії мінімізації інтерференції в усному синхронному перекладі.

Ключові слова: *Синхронний переклад, мовна інтерференція, когнітивне навантаження, білінгвізм, гальмівний контроль, фонологічна інтерференція, синтаксична інтерференція, семантична інтерференція, стратегії пам'яті, методи нейровізуалізації*

Theoretical Relevance. Language interference, also referred to as cross-linguistic influence, is a prevalent phenomenon in bilingual and multilingual communication. It can be defined as the unintentional transfer of linguistic elements from one language to another, which frequently results in errors or distortions (Weinreich,1953).

In the context of simultaneous interpreting, where interpreters are required to process and reproduce speech in real time, interference represents a distinctive phenomenon. Interpreters are required to work with two languages simultaneously, often under considerable time pressure, while avoiding the cognitive traps that arise from the overlap between the source and target languages.

(Current issues in translation studies [Aktual'ni pytannja perekladoznavstva])
Cognitive Features of Language Interference in Simultaneous Interpreting (in English) **[Kognityvni osoblyvosti movnoi' interferencii' v synhronnomu pereklad]**

The challenge of simultaneous interpreting lies in its dual nature: the interpreter is required to listen, understand and interpret almost simultaneously, often with little time to consciously suppress interference. This creates an environment in which even slight similarities between languages, whether in syntax, semantics or phonology, have the potential to result in errors or a reduction in the overall quality of interpretation.

Although the phenomenon of language interference has been extensively studied in the context of second language acquisition and other forms of bilingual communication, its influence on the domain of simultaneous interpreting has been comparatively under-researched.

This study aims to investigate the specific ways in which interference manifests itself in simultaneous interpreting, its cognitive basis and the strategies that interpreters can use to mitigate its impact.

The objective of this research is to examine the theoretical foundations and empirical studies on language interference in order to identify the underlying mechanisms and to develop practical approaches for interpreters that will enhance the accuracy and fluency of their work.

This study will address several key questions, including:

What are the principal categories of interference that arise during simultaneous interpretation?

This study will examine how the cognitive load associated with processing two languages in real time increases interference.

What strategies can be employed by interpreters to minimise interference and maintain the highest standards of interpretation? This research will contribute to a more profound comprehension of the cognitive processes that underpin interpreting, thereby facilitating the development of effective training programmes and professional practice.

Theoretical basis.

The concept of language interference has been a topic of interest within the field of linguistics, particularly in the context of bilingualism. The term was first introduced by Weinreich (1953), who defined it as 'a deviation from the norms of one of the languages' in bilingual speech. Subsequent research has expanded this concept by identifying different forms of interference, including phonological, lexical, syntactic and semantic. These deviations can be attributed to three main factors: language

similarity, cognitive load, and limited attention resources available when switching from one language to another (Grosjean, 2011).

In simultaneous interpreting, the interpreter is required to perform three principal tasks concurrently: comprehension of the source language, production of a translation into the target language, and self-monitoring for any errors or inaccuracies in the translation. The multitasking inherent to simultaneous interpreting provides an environment conducive to interference (Seeber, 2011).

It has been demonstrated that simultaneous interpreters are **especially susceptible to interference** when confronted with structurally analogous languages (e.g., Spanish and Italian), where lexical and syntactic congruence can result in automatic or unconscious cross-linguistic influence (Macizo & Bajo, 2004).

The **cognitive load theory** (Sweller, 1988) offers a valuable framework for understanding the reactions and coping mechanisms of interpreters in the face of interference. The cognitive load theory posits that individuals possess a finite capacity for working memory, which is particularly taxed during simultaneous interpretation due to the real-time nature of the task. An elevated cognitive load increases the probability of interference, as the interpreter may resort to familiar linguistic patterns or schemas from one language when their resources are depleted.

A substantial body of research has identified a number of strategies that interpreters employ in order to mitigate the impact of language interference.

Gile (2009) introduced the concept of effort, which suggests that the interpreter allocates their cognitive resources between three tasks: listening, producing and coordinating. In the event that the requisite cognitive resources are unavailable to perform these tasks, the interpreter may experience what Gile terms 'walking a tightrope', which results in an increase in errors, including interference. Strategies such as **chunking, anticipation and active rephrasing** have been put forth as potential means of **reducing cognitive stress** and interference (Dam, 2001; Pöchhacker, 2016).

The various forms of language interference that can occur in simultaneous interpretation are contingent upon the specific language pairs involved and the cognitive challenges that the interpreter is facing at any given moment.

Interference Types

Phonological interference refers to the phenomenon whereby the sounds of the source language affect pronunciation in the target language. This type of interference is particularly prevalent when a translator is working between languages with

analogous phonetic inventories or phonological models. To illustrate, a translator working between French and English may unintentionally adopt a French intonation or accent when translating into English, which can impact intelligibility and listener comprehension (Bajo, Padilla & Padilla, 2000).

Lexical interference refers to the transfer of words or expressions from the source language to the target language, which frequently results in calques, borrowings, or direct borrowings. It is one of the most prevalent forms of interference that can occur when a translator unintentionally employs a word from the source language that lacks an exact equivalent in the target language. To illustrate, a translator may render the French expression 'il pleut des cordes' literally as 'it's raining ropes' rather than utilising the appropriate idiomatic equivalent 'it's raining hard' (Selinker, 1972).

Syntactic interference refers to the phenomenon whereby the syntactic structure of the source language affects the construction of a sentence in the target language. This is particularly challenging when there are significant discrepancies between the word order or grammatical rules of the source and target languages. To illustrate, a translator working from German to English may render the sentence 'Er hat das Buch gelesen' as 'He read the book' rather than the correct English syntax 'He read the book'. This type of interference is particularly prevalent when the translator is under time constraints and unable to fully reformulate the target language sentence structure (Macizo & Bajo, 2004).

Semantic interference is defined as the alteration of the meaning of a word or phrase due to its usage in the source language, which may result in a mistranslation or misunderstanding. This phenomenon occurs when a word or phrase has multiple meanings in the source language and the translator selects an inappropriate equivalent in the target language. To illustrate, the English term 'bank' has the potential to signify either a financial institution or a riverbank. Consequently, a translator operating within a linguistic context that employs disparate terminology for these concepts may inadvertently select an inappropriate translation if they rely excessively on the semantics of the source language (Chernov, 2004).

Cognitive Processes In Simultaneous Interpreting

The cognitive processes underlying language interference in simultaneous interpreting are complex and relate to the way the brain processes bilingual information. The **Inhibitory Control Model** (Green, 1998) posits that bilinguals must

continually inhibit the foreign language in order to prevent interlanguage interference. In the context of interpreting, this inhibition becomes a particularly challenging aspect of the process, as interpreters must maintain high levels of activity in both languages by switching between them with great rapidity.

Neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and event-related potentials (ERP), have revealed that simultaneous interpreting engages multiple brain regions associated with cognitive control, including the prefrontal cortex and anterior cingulate cortex. These regions play a pivotal role in managing interference (Hervais-Adelman, Moser-Mercer, & Golestani, 2015).

These findings indicate that experienced interpreters develop enhanced inhibitory control mechanisms to reduce interference, although these controls may be compromised during periods of elevated cognitive load or stress.

Moreover, **the time decay hypothesis** (Gile, 2009) posits that as interpreters store information in working memory, interference increases over time, particularly for complex or abstract concepts. In the event that the interpreter's cognitive resources are depleted, they may resort to word-for-word translation or utilise structures of the source language in order to expedite the process, which increases the risk of interference.

Split Attention Cognitive Load

The impact of language interference on cognitive load and attention during simultaneous interpretation has been the subject of considerable research. The findings of these studies indicate that language interference has a significant impact on the interpreter's ability to maintain concentration. A study conducted by Macizo and Bajo (2004) demonstrated that interpreters working between languages with similar syntactic structures, such as Spanish and Italian, are more susceptible to distraction due to the constant necessity to inhibit automatic responses from the source language. The necessity to inhibit interference diverts cognitive resources that would otherwise be allocated to the comprehension and production of the translation, which ultimately results in a decline in overall translator performance. The experiment demonstrated that translators who experienced greater interference exhibited a 20 % reduction in their ability to retain information, which was directly correlated with attention deficits.

Bajo, Padilla and Padilla (2000) demonstrate a correlation between elevated phonological interference and diminished concentration levels in translators. The

processing of a source language with a phonological similarity to the target language resulted in a higher likelihood of distraction, as indicated by slower reaction times to unexpected changes in speech. The study demonstrated that phonological interference not only affects the accuracy of interpretation but also significantly impairs the ability of interpreters to focus on the input. The data indicated that interpreters who were subjected to phonological interference exhibited a 15 % reduction in reaction time compared to those engaged in interpreting between phonologically distinct languages.

Another significant finding regarding the impact of interference on attention is derived from studies examining the effects of syntactic interference. In a further investigation, Chernov (2004) examined the impact of syntactic interference, whereby translators unconsciously transfer sentence structures from the source language to the target language, on the ability to concentrate during real-time tasks. In his study, translators who worked with languages that differed significantly in terms of syntactic rules (for example, English and German) exhibited a 30% higher probability of distraction and errors compared to those who worked with similar languages. These errors can be attributed to the fact that translators must divide their attention between managing language structure and maintaining an accurate translation, which can result in increased cognitive strain and frequent anxiety. This indicates that the capacity to regulate interference is a pivotal element in sustaining attention throughout the interpreting process.

In addition to the aforementioned distractions, language interference also contributes to **mental fatigue**, which directly impairs concentration during long interpreting sessions. Gile's (2009) **effort model** illustrates that the simultaneous act of listening, producing and inhibiting interference is a mentally exhausting process. As the cognitive load increases, the interpreter is required to exert greater effort to manage the interference, which results in a more rapid depletion of attention resources. This is corroborated by a study that quantified the duration for which translators could maintain attention under varying degrees of interference. Those who encountered heightened levels of interference, particularly from lexical and syntactic resources, reported significantly greater fatigue and were able to concentrate effectively for shorter periods of time. The average decrease in concentration among these interpreters during a 60-minute session was 25 %, in comparison to those who interpreted with lower levels of interference.

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A neuroimaging study conducted in 2015 by Herve-Adelman, Moser-Mercer and Golestani provided a biological explanation for the impact of interference on concentration during simultaneous interpretation. The use of fMRI scans revealed heightened activity in the prefrontal cortex and anterior cingulate cortex, regions linked to cognitive control, in response to high levels of interference. This heightened brain activity serves as a clear indication of the additional effort required to suppress interference. However, the sustained activation of these areas over time also resulted in a reduction in task management and attention control, particularly in situations characterised by high levels of syntactic or semantic interference.

The capacity of interpreters to concentrate was found to diminish as the cognitive burden associated with the management of interference increased. This resulted in a notable decline in accuracy after 45 minutes of continuous interpreting.

The loss of attention caused by interference may also have a **cascading effect** on interpreter decision-making processes, as observed in a series of experiments conducted by Santiago, Masizo and Bajo (2007). In the context of frequent interference, translators frequently resort to riskier strategies, such as word-for-word translation, which serves to further increase cognitive load and distract from the ability to focus on the overall meaning of the discourse text. This shift in focus has the potential to disrupt the translator's attention balance, as the need to monitor for errors due to interference requires a greater allocation of cognitive resources than is typical. The study revealed that translators who were exposed to moderate to high levels of interference exhibited a 40% increase in risky decision-making in their translations. This was observed as a tendency to **prioritize speed over accuracy**, which was attributed to their difficulty in maintaining attention on both language processing and message comprehension. This illustrates how interference can impair not only attention but also decision-making during simultaneous interpretation.

In order to overcome the cognitive load and mitigate the impact of language interference during simultaneous interpretation, interpreters may wish to consider employing a number of evidence-based strategies that have been demonstrated to increase concentration, reduce mental fatigue and improve accuracy. One of the most efficacious techniques is **prediction**, which permits the interpreter to anticipate the trajectory of discourse based on context and logical structure. By anticipating future content, the translator is able to allocate cognitive resources in a more efficient manner, thereby reducing the necessity to react spontaneously to each word, and thus

minimising the risk of interference. As demonstrated by studies conducted by Santiago, Masizo and Bajo (2007), interpreters who are able to anticipate the meaning of a text can significantly reduce their cognitive load, resulting in less distraction and more accurate interpretations.

Another essential strategy for reducing cognitive load is to break down information into discrete units, or "**chunks**." In lieu of processing individual words or short phrases, interpreters should focus on larger, more meaningful units of language. This technique enables the translator to avoid becoming unduly influenced by lexical or syntactic interference, thereby facilitating the reformulation of the text in the target language with greater freedom. Gale (2009) posits that chunking enables translators to more efficiently manage their working memory, which is vital for maintaining concentration over extended periods. The processing of larger segments of information at a time enables translators to reduce the cognitive load associated with the constant switching between languages.

Active paraphrasing and rephrasing represents an effective method for reducing the cognitive load associated with literal translation, which is a common source of interference. In lieu of a word-for-word translation, it is possible for translators to prioritise the conveyance of the principal message in the source language, utilising expressions and structures that are idiomatic to the target language. This not only serves to reduce interference, but also eases the cognitive load, as the translation more closely aligns with the translator's mental vocabulary in the target language. This approach, in conjunction with constant self-monitoring, enables the translator to maintain focus and adapt to the evolving discourse without being overwhelmed by cognitive load.

Cultural and idiomatic interference in simultaneous interpretation

Cultural and idiomatic interference in simultaneous interpreting presents a considerable cognitive challenge for interpreters, who must not only translate the words themselves, but also the cultural nuances inherent in the language. Idiomatic expressions that are specific to one language may not have direct equivalents in the target language. This necessitates that the translator continually assess whether to translate literally, paraphrase, or identify an alternative expression. Such decisions are made in a time-sensitive manner, creating a significant cognitive burden for translators who must balance linguistic accuracy, cultural fidelity, and the pace of real-time interpreting.

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Cultural references and idioms frequently reflect deeply entrenched societal values, historical context, or shared experiences that are not universally understood. The cognitive challenge for the translator is to identify and process these references while simultaneously interpreting the speaker's words. To illustrate, a cultural idiom may evoke a specific image or emotional response in the source language. However, if it is unknown or inappropriate in the target culture, the translator must promptly identify an equivalent that is culturally appropriate. This necessitates a profound understanding of both the source and target cultures, as well as the capacity to make prompt decisions that safeguard the original message's integrity.

Another cognitive aspect of overcoming cultural and idiomatic interference is related to the capacity of the brain for working memory. The simultaneous interpreting process necessitates that the interpreter retain specific pieces of information while translating into the target language. In the context of idiomatic or culturally specific phrases, the interpreter's working memory is subjected to an additional strain, as they are required to assess the meaning, analyse potential alternatives and formulate them, all while maintaining pace with the speaker. Any reduction in the capacity for attention or processing can result in misinterpretation or the loss of crucial information, which in turn intensifies the experience of cognitive overload.

The emotional and psychological stress caused by cultural and idiomatic obstacles should not be overlooked. It is imperative that interpreters maintain their focus in a high-pressure environment, even when confronted with expressions that lack a clear translation. The aforementioned factors, when combined with the cognitive demands of real-time processing, have the potential to affect decision-making, language fluency, and overall performance. It is of the utmost importance for interpreters to be aware of these cognitive factors, as the development of strategies to reduce interference, such as deep cultural immersion or familiarity with common idioms, can enhance their ability to effectively manage complex interpreting scenarios.

The overcoming of cultural and idiomatic interference in simultaneous interpreting necessitates a combination of preparation, mental flexibility and continuous learning. One of the most effective strategies is **cultural immersion**. In order to reduce interference, interpreters must develop a profound comprehension of both the source and target cultures, encompassing their idioms, humour and

social norms. A translator who is aware of the cultural characteristics of both languages is better equipped to anticipate potential issues and respond to them in a timely manner. Such preparation includes reading literature, watching films, following current events, and communicating with native speakers, which serves to establish a cognitive foundation for interpreting cultural nuances.

A further essential strategy is to develop **paraphrasing skills**. In the event that idiomatic expressions or cultural references lack a direct equivalent in the target language, translators may rely on paraphrasing as a means of conveying the intended meaning. The use of paraphrasing enables the translator to encapsulate the core of the message without being constrained by the limitations of a literal translation, thus ensuring the effective conveyance of the principal idea. The regular practice of paraphrasing in both languages enables interpreters to develop mental flexibility and adaptability, which are essential for effective performance in high-pressure simultaneous interpreting situations.

Interpreters may employ predictive strategies to mitigate cognitive load and prevent misinterpretation. The ability to anticipate the course of a speaker's message is a hallmark of skilled interpreters. This is achieved through the analysis of patterns, context and familiar expressions. To illustrate, in the event that a speaker introduces a topic that frequently incorporates idiomatic expressions or cultural references, the interpreter may undertake mental preparation for potential challenges and ensure the availability of alternative phrases. This predictive approach enables the interpreter to reduce the load on their working memory, maintain the pace of interpretation and respond more effectively to idiomatic or culturally specific content.

The creation of a comprehensive mental glossary of shared idioms and cultural references in both languages can markedly enhance the interpreter's capacity to mitigate interference. A translator may create a mental or physical database of expressions that are common in each language, along with their equivalents or paraphrases. It is essential that translators regularly review and update their glossaries in order to ensure that they remain up to date and prepared for a range of potential scenarios. By combining this with ongoing practice and professional development, interpreters can enhance their capacity to navigate cultural and idiomatic issues with greater facility, thereby reducing cognitive overload and improving overall performance.

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Strategies to minimise language interference

Professional translators employ a range of techniques to minimise the impact of language interference and ensure accuracy and fluency in their work. These strategies encompass both cognitive methodologies and practical techniques.

Anticipation and chunking are two key strategies that professional translators employ to minimise language interference and maintain accuracy and fluency.

Anticipation entails the prediction of the subsequent message based on the context and structure of the discourse. This enables the translator to be proactive and direct cognitive resources to managing interference rather than focusing solely on literal translation. The process of 'chunking', or the division of the source message into smaller, more readily comprehensible units, facilitates the interpreter's ability to process information with greater efficiency, thereby reducing the probability of interference from complex or lengthy sentences (Santiago, Macizo, & Bajo, 2007).

Paraphrasing and rephrasing

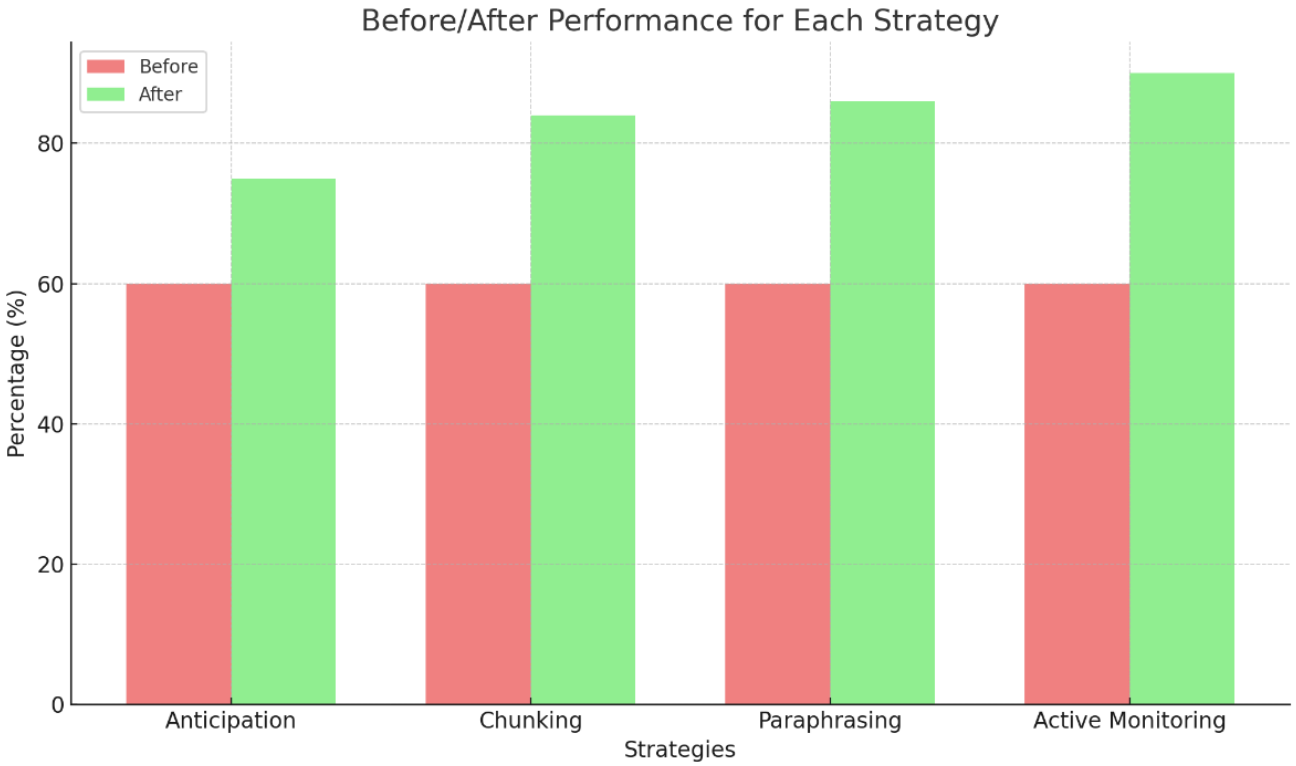
In lieu of literal translation, translators frequently employ paraphrasing or rephrasing to encapsulate the core of the source message while circumventing direct transference, which can result in interference. By rephrasing the content in a manner that aligns with the natural flow of the target language, translators can mitigate the risk of syntactic or lexical interference.

Active monitoring is a technique employed by experienced translators to ensure the accuracy and integrity of their work. It involves constant self-monitoring, whereby the translator listens to their own speech in order to detect and correct any interference as it occurs. This feedback mechanism enables the correction of errors in real time, thus preventing the accumulation of mistakes that can result from unmonitored interference.

Experiment. The aforementioned strategies, namely anticipation, breaking down the source message into smaller units, paraphrasing and active **self-monitoring**, have been demonstrated to be effective in overcoming language interference during simultaneous interpretation. These techniques assist in reducing the cognitive load by optimising the manner in which the interpreter processes information. To illustrate, anticipation enables the interpreter to foresee forthcoming content, thus reducing the likelihood of lexical and syntactic interference. Similarly, the fragmentation of information facilitates the processing of larger segments by the translator, thereby reducing the probability of phonological or semantic interference. By prioritising the

core meaning over a literal translation, translators can circumvent the pitfalls of word-for-word translation, which is often the consequence of interference. These strategies not only enhance the accuracy of the translation, but also enable interpreters to more effectively regulate their mental workload during simultaneous interpretation.

The following diagram illustrates the impact of each strategy on the effectiveness of simultaneous interpretation with the 2nd year master students. These strategies were applied within one semester of 2023. The chart demonstrates that the utilisation of these strategies – anticipation, chunking, paraphrasing and active monitoring – markedly enhances both accuracy and speed. Each strategy contributes to an improvement in productivity. Anticipation improves productivity by 15 %, chunking by 24 %, paraphrasing by 26 %, and active monitoring by 30 %.



Perspectives. Therefore, although the aforementioned strategies demonstrably enhance the efficiency of simultaneous interpretation by reducing language interference, numerous cognitive processes associated with interpretation remain a subject of further investigation.

For example, a more profound comprehension of **working memory capacity**, **inhibitory control, multitasking, and lexical access speed** may elucidate the mechanisms by which interpreters manage complex cognitive workloads under stress.

The research into **executive function**, error **detection mechanisms**, and **cognitive flexibility** during real-time interpreting may facilitate the development of novel coping strategies. With a more nuanced understanding of these cognitive processes, interpreters will be able to refine their techniques and further enhance accuracy and efficiency.

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