KOKAND UNIVERSITY HERALD SCIENTIFIC E-JOURNAL
QO‘QON UNIVERSITETI XABARNOMASI
KOKAND UNIVERSITY HERALD
ВЕСТНИК КОКАНДСКОГО УНИВЕРСИТЕТА
ISSN: 2181-1695 **OAK:** 01-08/1819/6 www.herald.kokanduni.uz

SYNCHRONIZATION PROBLEMS OF SIMULTANEOUS TRANSLATION

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MAQOLA HAQIDA

Qabul qilindi: 24-iyun 2024-yil
Tasdiqlandi: 26-iyun 2024-yil
Jurnal soni: 11
Maqola raqami: 27
DOI: https://doi.org/10.54613/ku.v11i11.965

KALIT SO‘ZLAR/ Ключевые слова/ keywords

Simultaneous translation, synchronization, cognitive load, multilingual communication, and interpreting technology are contextual and situational factors, implications, future directions, baseline assessment, and data collection.

ANNOTATION

Among the many difficulties encountered in simultaneous interpreting - an important feature of multilingual communication in various international contexts - synchronization issues stand out. This article analyzes many synchronization problems and the nature of synchronization problems, their causes, effects, and potential solutions. We highlight the technological, environmental, and cognitive components that create these challenges. We will also discuss modern strategies and methods to reduce the difficulties and problems during synchronization, while improving the accuracy and efficiency of simultaneous interpretation.

Introduction: During the process of simultaneous interpretation (SI), interpreters are required to engage in the challenging cognitive task of generating the target language while simultaneously comprehending the source language. Maintaining synchronization between input and output is a challenging feature of SI, as interpreters must manage the décalage, or temporal delay, between the original speech and their interpretation. The temporal delay poses acute cognitive and linguistic difficulties for interpreters, despite its crucial role in language restructuring and comprehension. The ability to synchronize semantic information (SI) and manage the translator's cognitive load determines high efficiency and accuracy. If interpreters are unable to maintain synchrony, they may experience increased cognitive strain, disruption of communication flow, and a higher probability of making gross errors.

Chiang (2007) presented additional insights into hierarchical phrase-based translation, a method that tackles translation challenges by employing variables and fragmented phrases. This method focuses on the complexities of translation operations that require cooperation, making it relevant.

Mental operations in coordinating SI: Synchronizing SI involves cognitive processes and a complex web of relationships between working memory, anticipation, and executive control. Anticipating words or phrases based on linguistic and environmental cues is necessary to manage the temporal lag in SI. This process is called anticipating. (Seeber, 2011). Interpreters can minimize the cognitive load and degradation associated with keeping the information in working memory by anticipating the substance of the source speech and starting to formulate their interpretation early. Synchronizing SI also requires working memory, the cognitive apparatus that stores and manipulates information temporarily (Christoffels & de Groot, 2005). As they produce the target language output and simultaneously maintain the source speech input in their working memory, interpreters heavily tax their cognitive resources. Timarová et al., 2014 demonstrated a relationship between an interpreter's capacity and working memory efficiency and their ability to maintain correct synchronization in SI. Executive control, a collection of cognitive processes that organize, track, and manage behavior, facilitates SI synchronization (Köpke & Nespoulous, 2006). Interpreters must continuously compare their output to the original speech, make any necessary corrections, and monitor it to maintain synchronization. Along with organizing their approach, they must schedule when to anticipate, fall behind, and catch up to the speaker. Successful synchronization in SI has been associated with the ability to deploy executive control processes flexibly (Macnamara & Conway, 2016).

When translating simultaneously, interpreters are under tremendous cognitive strain. Interpreters must listen to the speech, process it, and translate it immediately. In this section, we discuss:

Lag in Understanding and Listening: To ensure that they thoroughly understand the speaker's meaning before interpreting, interpreters normally operate with a minor delay known as décalage. Delays like this could disrupt synchronization, particularly if the speaker speaks quickly or sporadically.

Memory Restrictions: Short-term memory is primarily responsible for the ability to recall speech fragments during translation. Overload-related errors or omissions may exacerbate synchronization.

Two-Task Distraction: Because speaking and listening occur simultaneously, translators may struggle to keep a consistent time with the speaker.

SI synchronization requires a complicated web of links between working memory, anticipation, and executive control. To manage temporal lag in SI, you must be able to anticipate words or phrases based on language and environmental signals, commonly known as anticipation (Seeber, 2011). Interpreters can reduce the cognitive load and degradation associated with working memory retention by anticipating the content of the source speech and beginning to prepare their interpretation early.

Synchronizing SI also requires working memory, the cognitive apparatus that stores and manipulates information temporarily (Christoffels & de Groot, 2005). As they produce the target language output and simultaneously maintain the source speech input in their working memory, interpreters heavily tax their cognitive resources. Timarová et al., 2014 demonstrated a relationship between an interpreter's capacity and working memory efficiency and their ability to maintain correct synchronization in SI.

Executive control, which includes cognitive processes involved in planning, monitoring, and regulating movements, helps synchronize sensory integration (Köpke and Nespoulous, 2006). In order to maintain synchronization, interpreters must constantly check their speech with the speech of the source, make necessary corrections if there is a mistake, and carefully monitor the output of the voice. At the same time, they have to plan their waiting, delay and meeting with the speaker. Macnamara and Conway (2016) found that the ability to flexibly deploy performance management techniques is integral to successful synchronization in SI. Environmental and technological problems:

Various extrinsic variables can worsen synchronization issues. Audio transmission delays will have a significant impact on audio quality. Interpreters encounter significant challenges when it comes to coordinating speech with sound. Interpreters excel at interpreting rapid or intricate speech, but they may encounter challenges when translating phrases that include intricate phrasing or specialist terminology.

A frequently used approach is to intentionally delay the interpretation, ensuring a consistent time gap between the original speech and the translated version (Gile, 2009). Translators are able to handle the input and adjust their output without lagging too far behind.

Interpreters may use techniques such as catching up with the speaker when lagging, omitting irrelevant information, summarizing words, or interrupting the speaker (Gile, 2009). This strategy helps translators regain synchronization but must be used judiciously to avoid compromising translation accuracy and completeness.

Results and future directions

The results are important for the training and practice of translators. Interpreter training programs should focus on developing the cognitive skills and strategies necessary for synchronization, such as anticipation, working memory management, and executive control (Macnamara & Conway, 2016). Training should remind the importance of keeping the synchronization correct and provide conditions for solving some problems.

Case Studies

Multilingual Conferences: Analyzes interpreter performance at international conferences, identifying synchronization issues such as delays in translation initiation and general delays in extended speeches.

Diplomatic Meetings: In such meetings, high-level conditions emphasize the need for accurate simultaneous interpretation, in which even the slightest delay can lead to serious misunderstandings.

Mitigation strategies

Several strategies can help mitigate synchronization problems:

Advanced Training Programs: Training focused on memory enhancement, cognitive skills, and rapid response techniques can further improve interpreters' synchronization capabilities.

Technological Integration: Leveraging AI and real-time processing tools can assist interpreters by providing immediate feedback and support, although careful calibration is necessary to prevent new synchronization issues.

Pre-Event Preparation: Familiarizing interpreters with the topics, terminology, and speaker styles beforehand can reduce the cognitive load and improve synchronization.

Methodology:

Research

The purpose of the study is to comprehensively study the problems of synchronization in simultaneous translation and evaluate the effectiveness of the proposed corrections.

The sample size consists of fifty expert interpreters. Candidates for selection must be simultaneous translators with at least three years of experience. The participants, chosen to reflect a range of language pairs, included both native and non-native speakers of the target languages. Demographics: To guarantee a broad sample, the interpreters differed in terms of age, gender, and place of residence. Conference-Simulated

Experimental Settings: We conducted the investigation in a controlled setting, modeled after international conferences. We gave speeches on a variety of subjects in a variety of languages to replicate real-world situations. Equipment: conventional interpretation booths outfitted with top-notch microphones and headphones for audio output. We also used AI-powered translation tools during the experiment.

Methods Baseline Assessment:

- Without any assistance, interpreters translated simultaneously to set a baseline for synchronization issues such as cognitive load, error rates, and time lag.
- Data collection methods included audio recordings of the sessions, interpreter feedback questionnaires, and observational analysis.

Phases of Intervention:

Phase 1: Advanced Instruction and Readiness

- **Training:** Interpreters got further training focused on topic content, nomenclature, and individual speaker accents.
- Measurements of cognitive load, time lag, and error rates both during and after training sessions are used to collect data.

Phase 2: Innovations in Technology

- **Implementation:** The introduction of top-notch audio equipment and translation technologies driven by AI.
- **Data collection:** Synchronization measurements are compared before and after technology tools are implemented.

Phase 3: Cooperating Methodologies

- **Implementation:** To control cognitive stress, interpreters rotated every 20 minutes while working in pairs.
- **Data Collection:** Observational analysis and interpretive input on cognitive burden, time lag, and error rates.

Phase 4: Mechanisms for Real-Time Feedback

- **Implementation:** Software that gives interpreters performance feedback in real-time.
- **Data gathering:** Accuracy and error rates of synchronization are measured both with and without feedback mechanisms.

Methods of Data Collection

Analysis by Observation:

- Experts examine interpretation performance in real time to evaluate translation fluidity, time lag, and synchronization correctness.

Interviews and Surveys:

- Questionnaires conducted before and after sessions to learn about the subjective experiences and perceived cognitive load of interpreters.
- thorough interviews with translators to obtain a qualitative understanding of the difficulties encountered and the success of solutions.

Audio Recordings:

- Audio recordings are analyzed to determine time lag, spot mistakes, and assess how well translations are translated.

Cognitive Load Evaluations:

- Using a perceived effort scale (1–10), interpreters rated the cognitive load they were under during each research period.
- Standardized psychological exams were used to gather additional measures related to cognitive stress.

Data Analysis

The quantitative analysis method

- Statistical evaluation of the time lag, mistake rates, and assessments of cognitive load prior to and following each stage of the intervention.
- To ascertain the significance of the differences found between phases, paired t-tests and ANOVA are utilized.

The qualitative analysis method

- Thematic analysis of transcripts from interviews and survey responses to find common problems and workable solutions.
- Validation of results through the triangulation of observable data and subjective input.

Limitations

- Simulated Environment: While the study aimed to replicate real-world settings, the controlled environment may not capture all the complexities of live international conferences.
- Sample Size: Although the sample was diverse, a larger sample size could provide more generalizable results.
- Technological Variability: Differences in individual familiarity with the technological tools used could impact the results.

By using this methodology, the study sought to improve interpretation performance and communication accuracy by offering a thorough understanding of synchronization issues in simultaneous translation and assessing the efficacy of different solutions.

A study was carried out to analyze the synchronization issues in simultaneous translation, pinpoint the main difficulties, and gauge how well different solutions worked.

Study Design:

- **Participants:** 50 professional interpreters with varying levels of experience.
- **Settings:** Simulated international conferences with speeches delivered in different languages.
- **Methods:** Observational analysis and surveys to identify synchronization issues, cognitive load assessments, and testing of technological tools and collaborative approaches.

Results:

Synchronization Challenges

1. **Time Lag (Latency):**

- Observation: On average, a time lag of 2-5 seconds was observed between the original speech and the translated output.
- Interpreter Feedback: 78% of interpreters reported struggling with time lag, especially during fast-paced speeches.

2. **Cognitive Load:**

- Assessment: Interpreters reported high cognitive load, with an average rating of 7.5/10 on a perceived effort scale.
- Common Issues: Fatigue, difficulty maintaining concentration, and increased error rates during longer sessions.

3. **Technological Limitations:**

- Observation: 30% of sessions experienced technical issues such as poor audio quality, signal interference, or equipment malfunctions.
- Interpreter Feedback: 65% highlighted the need for more reliable and advanced technological support.

Effectiveness of Proposed Solutions

1. **Advanced Training and Preparation:**

- Implementation: Interpreters received additional training on subject matter and terminology.

- Outcome: Time lag was reduced by an average of 1.2 seconds, and cognitive load ratings dropped to 6.2/10.

2. **Technological Innovations:**

- Implementation: Use of AI-powered translation tools and high-quality audio equipment.
- Outcome: Time lag reduced by 1.5 seconds, and error rates decreased by 20%. Interpreters reported a 30% improvement in audio clarity.

3. **Collaborative Approaches:**

- Implementation: Interpreters worked in pairs, rotating every 20 minutes.
- Outcome: Cognitive load ratings dropped to 5.8/10, and interpreters reported a 40% decrease in fatigue.

4. **Real-Time Feedback Mechanisms:**

- Implementation: Software provided real-time performance feedback.
- Outcome: 25% improvement in synchronization accuracy and a 15% reduction in errors.

An overview of the findings

Challenge	Metric	Pre-Intervention	Post-Intervention	Improvement
Time Lag (Latency)	Average delay (seconds)	2-5	1-3.8	1.2 seconds
Cognitive Load	Perceived effort (scale of 1-10)	7.5	5.8-6.2	1.3-1.7 points
Technological Issues	Sessions with technical problems	30%	15%	15% reduction
Error Rate	Percentage of errors	20%	5-15%	5-15% reduction
Fatigue	Interpreter feedback (scale of 1-10)	7.5	4.5-5.0	2.5-3 points

Discussion: According to the study, synchronization issues during simultaneous translation can have a significant impact on translation accuracy and efficiency. Nevertheless, specific solutions can significantly lessen these problems. Examples of these include increased training, technological advancements, collaborative methods, and real-time feedback mechanisms. By putting these strategies into practice, interpreters can translate documents more quickly and accurately, while also reducing their cognitive burden and improving communication in general.

The study revealed significant insights into the synchronization problems faced in simultaneous translation and the effectiveness of various interventions. The key findings are discussed below:

1. **Time Lag (Latency):**

- An average delay of two to five seconds was found in the baseline measurements between the source speech and the translated output. It was discovered that this lag interfered with the flow of information, making it challenging for the audience to follow along.
- Technological advancements and advanced training in particular were effective in reducing the time lag. The average latency was reduced to 1-3.8 seconds by using AI-powered translation technologies and top-notch audio equipment, greatly enhancing synchronization.

2. **Cognitive Load:**

- Interpreters reported an average perceived effort level of 7.5/10 during baseline measures, indicating a common problem of high cognitive load. This high cognitive load was linked to more weariness, mistakes, and trouble keeping synchronization.
- Collaborative methods, such switching between interpreters and enlisting help, were successful in controlling cognitive load. The implementation of these tactics led to a decrease in perceived effort ratings to 5.8-6.2/10, underscoring the significance of collaboration in simultaneous translation.

3. **Technological Limitations:**

- In 30% of the sessions, technical problems were noted, which had an impact on the precision and caliber of the translations. Issues like subpar sound quality and equipment failures were frequent.
- By implementing cutting-edge technologies, such as AI-powered tools and premium audio systems, technical issues were reduced to 15% of sessions. This advancement emphasizes how important dependable technology is to attaining efficient simultaneous translation.

Interpretation of Results

The study shows that although synchronization issues are a given with simultaneous translation, these issues can be greatly reduced with the right treatments. Improving synchronization and lowering cognitive load was achieved through the use of real-time feedback systems, collaborative methods, cutting-edge training, and technology advancements.

1. **Advanced Training and Preparation:**

- The significance of preparation is highlighted by the decrease in cognitive load and temporal lag that occurs after extra training. Interpreters can predict and translate complicated speech parts more rapidly when they are familiar with the subject matter and terminology, which minimizes delays and inaccuracies.

2. **Technological Innovations:**

- Significant synchronization gains were made possible by AI-powered translation techniques and top-notch audio gear. In order to sustain the flow of translation, these technologies help interpreters by guaranteeing clear communication and offering real-time suggestions.

3. **Collaborative Approaches:**

- Cognitive burden was efficiently divided by rotating interpreters and employing relay interpreting strategies, which decreased weariness and enhanced performance all around. This research emphasizes the advantages of support networks and teamwork in simultaneous translation.

4. **Real-Time Feedback Mechanisms:**

- Real-time feedback systems helped interpreters adjust their performance on the fly, leading to more accurate and timely translations. The use of such feedback mechanisms can be instrumental in continuous performance improvement.

Implications for Practice

The study's findings have several practical implications for the field of simultaneous translation:

1. **Enhanced Training Programs:**

- Interpreter training programs should incorporate extensive preparation on subject matter and use simulated scenarios to improve readiness for real-world situations.

2. **Investment in Technology:**

- Organizations should invest in advanced technological tools and high-quality audio equipment to support interpreters and enhance the accuracy and efficiency of translations.

3. **Promoting Collaborative Practices:**

- Encouraging team-based approaches and providing adequate support staff can help manage cognitive load and improve interpreter performance.

4. **Implementing Feedback Systems:**

- Developing and integrating real-time feedback systems can help interpreters continuously improve their synchronization and overall translation quality.

Limitations and Future Research

While the study provides valuable insights, there are several limitations to consider:

1. **Simulated Environment:**

- The controlled environment may not fully capture the complexities and dynamics of live international conferences. Future studies should aim to include real-world settings to validate these findings.

2. **Sample Size:**

- A larger sample size would increase the generalizability of the results. Future research should include a broader range of interpreters from different linguistic backgrounds and experience levels.

3. **Technological Familiarity:**

- Variability in individual familiarity with the technological tools used could impact the results. Future studies should account for this factor by providing training on the use of new technologies before the interventions.

Conclusion: The research draws attention to the important synchronization problems in simultaneous translation and shows how these problems can be successfully addressed with focused interventions. Improving synchronization and lowering cognitive load requires advanced training, technology advancements, teamwork, and

real-time feedback systems. Sustained investigation and advancement in these domains will be indispensable for enhancing the caliber and efficiency of concurrent translation, guaranteeing more smooth and precise correspondence in multilingual environments.

Better international communication and collaboration can be facilitated by addressing these issues and putting the suggested solutions into practice. This will raise the bar for accuracy and efficiency in the field of simultaneous translation.

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