

The Use of Special Symbols in Simultaneous Interpreting: Cognitive, Functional, And Strategic Dimensions

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Abstract: Simultaneous interpreting is one of the most cognitively demanding linguistic activities, requiring the interpreter to listen, process, translate, and produce speech almost simultaneously. While much research has focused on memory load, anticipation strategies, and linguistic competence, relatively less attention has been devoted to the use of special symbols and notation systems during interpreting tasks. Although note-taking is more traditionally associated with consecutive interpreting, professional simultaneous interpreters also rely on symbolic shorthand systems in booth settings for numbers, lists, technical terminology, and discourse markers. This study investigates the role, structure, and cognitive function of special symbols in simultaneous interpreting. Using a mixed-method design that combines observation, interpreter interviews, and experimental performance analysis, the research examines how symbolic systems support working memory, reduce cognitive overload, and enhance accuracy. Results indicate that individualized symbolic repertoires significantly improve information retention, especially in dense informational segments such as statistics and enumerations. Furthermore, interpreters who systematically develop personal symbol systems demonstrate greater fluency and fewer omissions. The findings highlight the strategic value of symbolic compression in real-time translation and suggest implications for interpreter training programs.

Keywords: Simultaneous interpreting, special symbols, cognitive load, note-taking, interpreter training, working memory, Gile's effort model, accuracy.

Introduction: Simultaneous interpreting (SI) represents one of the most complex forms of bilingual communication. Unlike written translation or even consecutive interpreting, SI requires near-instantaneous processing of incoming speech while simultaneously producing an equivalent message in another language. The interpreter must decode linguistic input, retain information in short-term memory, restructure syntax, anticipate upcoming content, and articulate the target message – all within a time lag of only a few seconds.

Given these constraints, cognitive overload becomes a constant risk. According to Gile's Effort Model (1995), simultaneous interpreting involves three primary efforts: listening and analysis, production, and memory. When the total processing capacity required

exceeds available cognitive resources, performance deteriorates. Errors, omissions, and disfluencies may occur. Therefore, interpreters develop compensatory strategies to optimize cognitive efficiency.

One such strategy is the use of special symbols—abbreviated visual markers, arrows, mathematical signs, diagrams, and shorthand systems—to externalize and compress information. Although note-taking has traditionally been associated with consecutive interpreting (Rozan, 1956), simultaneous interpreters also use minimalistic symbolic notation, especially for:

- a. Numbers and statistics
- b. Names and proper nouns
- c. Lists and enumerations

- d. Logical connectors
- e. Cause-effect relationships
- f. Contrast markers

These symbols are not full notes but cognitive anchors. They function as visual cues that reduce memory load and support structural coherence.

Despite their practical importance, systematic research on symbol usage in simultaneous interpreting remains limited. Most literature treats note-taking broadly without distinguishing between detailed consecutive notes and rapid booth-based symbolic marking. Furthermore, little empirical data exist regarding how symbol systems influence cognitive load and performance accuracy.

This study aims to fill that gap by examining:

1. What types of special symbols do simultaneous interpreters use?
2. How do these symbols affect memory retention and accuracy?
3. Are personalized symbol systems more effective than standardized ones?
4. What implications do these findings have for interpreter training?

By addressing these questions, the research contributes to both theoretical and pedagogical understanding of simultaneous interpreting strategies.

METHODS

This study employed a mixed-method research design. The research was conducted in three phases: descriptive observation, an experimental performance comparison, and qualitative interviews. Thirty professional simultaneous interpreters participated, divided into Group A (those using systematic symbols) and Group B (those relying primarily on memory).

The participants interpreted three types of standardized 10-minute speeches: a political speech (argumentative), a scientific presentation (terminology-heavy), and a business report (data-driven). Each speech was delivered at a controlled speed of 130–150 words per minute. Data were collected through audio recordings of the interpreting output and the collection of the interpreters' notes. Performance was evaluated based on accuracy rates, omission rates, and fluency indices. Three independent experts rated the recordings to ensure inter-rater reliability (Cohen's Kappa = 0.87). Statistical analysis, including t-tests and Pearson correlation, was used to examine the relationship between symbol frequency and interpreting quality.

RESULTS

This section reports (1) what kinds of special symbols appeared in interpreters' booth notes, and (2) how symbol use related to interpreting quality indicators (accuracy, omissions, and fluency), supplemented by qualitative patterns from interviews. Unless otherwise stated, "symbols" refer to non-lexical shorthand marks (e.g., arrows, mathematical signs, schematic grouping), not full-word abbreviations.

Types of symbols used in SI. Across the collected notes, five functionally distinct categories of symbols were consistently observed (especially in Group A, the symbol-structured group). While individual repertoires differed in exact form, the underlying functions were highly similar.

(1) Logical structure symbols. These symbols externalized relationships between propositions – helping interpreters maintain the argument skeleton of a segment without having to retain all links in working memory. Typical marks included:

- \rightarrow to encode progression or causality ("leads to," "results in," "therefore next").
- \neq to encode contrast ("however," "in contrast," "not the same as").
- $=$ to encode equivalence/definition ("X is/means Y," "i.e.").
- \uparrow / \downarrow to encode directional change ("increase/decrease," "improve/decline").
- \therefore to encode conclusion/inference ("therefore," "as a result").

In practice, these symbols were often combined into compact "logic chains" (e.g., a quick arrow sequence) that allowed the interpreter to reproduce the reasoning in a coherent target-language structure even when the source sentence was long, nested, or rhetorically dense.

(2) Temporal markers. Temporal notation functioned as a stabilizer for sequences, timelines, and shifts between past actions and future plans—areas where interpreters commonly risk misattribution (e.g., saying a future goal as if it already happened). Common patterns included:

- t_0 or a starting mark for "baseline/initial point."
- arrows indicating direction in time (backward for past reference, forward for projection).
- compact duration/continuity cues such as 24/7.

These were most helpful in segments where the speaker rapidly alternated between "previously," "currently," and "next year," or when multiple dates were clustered.

(3) Quantitative symbols. Quantitative shorthand targeted the most error-prone content in SI: numbers, percentages, monetary values, and magnitude markers. Notes frequently contained:

- % for percentages,
- \$ for money-related figures (even when the currency was not explicitly USD, the symbol served as a “finance” cue),
- magnitude compressions like k / m / bn.

This category functioned less as semantic structuring and more as precision preservation, allowing interpreters to reproduce numeric information rather than generalize it.

(4) Structural symbols. Structural marks were used to preserve discourse organization (especially enumerations), preventing list collapse (e.g., rendering three items as one generalized statement). Typical forms included:

- 1) 2) 3) for ordered lists,
- bullet dots for unordered lists,
- brackets/parentheses for grouping subpoints under a main point.

These symbols supported macro-coherence: interpreters could signal “first/second/third” in the target language at the right time, even if the speaker’s list items were long or interrupted by asides.

(5) Emphasis and evaluation markers. These symbols indicated importance, uncertainty, or “flagged” items that required attention.

- ! marked priority items (names, key claims, critical figures).
- ? marked uncertainty (unclear audio, ambiguous reference, or a term the interpreter wanted to handle cautiously).

- underlining/circling highlighted terms that needed accurate retrieval.

Although less frequent than logic or quantity symbols, these marks appeared at moments of peak processing pressure, suggesting they served as rapid meta-cognitive cues (“don’t lose this,” “verify before committing,” “handle carefully”).

Frequency of symbol usage. Symbol use differed sharply by group. Group A produced 18–25 symbols per 10-minute speech, whereas Group B produced 5–8 minimal markings (often isolated numbers or occasional underlining). The group difference was statistically significant (reported earlier as $p < 0.01$).

Importantly, Group A’s notes were not “dense note-taking” in the consecutive sense. Instead, the symbols tended to appear in bursts—notably when the source contained:

- rapid enumeration,
- multi-step reasoning (cause → effect → implication),
- high-density statistics.

This pattern supports the interpretation that symbols were used as a selective load-management tool, not as a continuous transcription attempt.

A correlational analysis showed a significant positive relationship between symbol frequency and accuracy ($p < 0.01$). In practical terms, interpreters who marked more symbolic anchors tended to reproduce more informational units correctly.

Accuracy comparison. Accuracy was evaluated as the proportion of correctly rendered informational units relative to the source speech (including key propositions, main qualifiers, and critical numerical values). Group A outperformed Group B in all speech types:

Speech type	Group A Accuracy	Group B Accuracy
Political speech	92%	85%
Scientific speech	89%	78%
Business report	94%	81%

The largest gap appeared in the scientific speech, which contained the highest concentration of technical terms and numerical statements. In rater comments, Group B’s lower accuracy in this condition was primarily linked to two patterns:

1. numerical degradation (numbers simplified, rounded, or replaced by vague quantifiers like “significantly” or “a lot”), and

2. relationship loss (cause–effect or contrast relations flattened into neutral statements).

By contrast, Group A more often preserved both the quantitative detail and the logical framing – consistent with their heavier use of quantitative and logic symbols.

Omission Rates. Omissions were coded when a

meaning-bearing unit present in the source was absent in the target rendition (excluding optional stylistic compression). Two omission patterns were particularly diagnostic:

(1) List-based omissions. Group B more frequently collapsed multi-item lists, producing partial enumerations or “summary-only” renderings. Group A demonstrated 40% fewer omissions in list-based segments, consistent with the presence of 1) 2) 3) structures and bracket grouping.

(2) Statistical and numeric omissions/errors. Group B more frequently omitted secondary figures (e.g., baseline values, time anchors, or ranges) and sometimes replaced exact quantities with generalized phrasing. Group A demonstrated 55% fewer errors in statistical information, indicating that even minimal numeric notation (e.g., %, \$, magnitude markers) materially supported precision.

These results suggest that symbol use was especially protective against high-cost omissions – i.e., omissions that change the informational value of a message in scientific and business contexts.

Fluency and Delivery. Fluency was assessed using observable delivery indicators (e.g., long pauses, hesitations, and self-corrections). Interpreters in Group A showed:

- fewer long pauses (pauses > 2 seconds occurred less often),
- fewer self-corrections and restarts,
- more stable sentence completion (fewer abandoned clauses).

From the raters’ perspective, Group A outputs sounded more structurally planned: even when the interpreter compressed content, the target speech maintained clearer connective logic (“however,” “therefore,” “as a result”) and smoother segmentation of lists.

Self-reported mental fatigue also differed: Group A reported lower perceived cognitive load (mean 6.1/10) compared with Group B (mean 7.8/10), with the difference reaching significance ($p < 0.05$). This aligns with the interpretation that symbols functioned as external memory supports, reducing the need to keep multiple anchors active in working memory.

Interview Findings (Qualitative Patterns). Interview data reinforced the performance findings and clarified why symbols helped.

Theme 1: Cognitive relief (external anchoring). Participants commonly described symbols as a way to “offload” key relations and figures so they could focus on reformulation and delivery. The repeated idea was that a single mark (e.g., \rightarrow or %) could preserve an

entire segment’s structure without retaining it internally.

Theme 2: Personalization over standardization. Most interpreters reported that symbol systems become efficient only when they are automatic and personally meaningful. Standard sets were useful as a starting point, but experienced interpreters adapted them to match their own processing habits (e.g., using the same arrow to mean “leads to” in one context and “next point” in another, as long as it remained internally consistent).

Theme 3: Selective usage (strategic deployment). Symbols were not used continuously. Instead, interpreters intensified notation during predictable risk zones: enumerations, dense statistics, and long causal chains. This selectivity matters because it suggests symbol use does not merely add a writing task; it is deployed when the expected cognitive payoff exceeds the cost.

DISCUSSION

The findings support the hypothesis that special symbols function as cognitive compression tools. By encoding conceptual relationships visually, interpreters reduce the “Memory Effort” component of Gile’s model, freeing up capacity for “Production Effort”. The significant performance gap in scientific speeches suggests that symbols are most beneficial when handling high-density numerical data and complex logical chains. The study also highlights that symbol usage is not mechanical but strategic; interpreters intensify notation during rapid enumerations or multi-step reasoning. From a pedagogical perspective, the results suggest that interpreter training should move beyond simple language skills to include the development of personalized symbolic notation systems. This “visual mapping” of discourse allows for greater syntactic stability and smoother prosodic delivery, as the interpreter is less likely to stumble over forgotten details.

CONCLUSION

The present study has systematically investigated the role of special symbols as a cognitive and strategic tool in simultaneous interpreting (SI). The findings provide robust evidence that symbolic notation is not merely a secondary aid but a fundamental mechanism for cognitive load management in high-pressure linguistic environments. By analyzing the performance of professional interpreters, this research has demonstrated that the strategic use of logical, quantitative, and structural symbols directly correlates with higher accuracy, reduced omission rates, and enhanced fluency.

The core contribution of this research lies in identifying symbols as “cognitive stabilizers”. In the context of Gile’s Effort Model, symbolic encoding effectively offloads the “Memory Effort” allowing the interpreter to reallocate finite mental resources toward “Analysis” and “Production”. This is particularly critical in data-heavy and technically dense discourses, such as scientific and financial presentations, where the risk of cognitive saturation is highest. The results showed that interpreters using structured symbolic systems achieved up to 11% higher accuracy in scientific contexts compared to those relying solely on internal working memory.

Furthermore, the qualitative data from this study underscores the importance of personalization in symbolic systems. While standardized shorthand provides a foundational framework, the most effective systems are those that have been internalized and adapted to the individual interpreter’s cognitive processing habits. This suggests that the “automaticity” of a symbol – the speed at which it can be written and decoded – is more vital than its aesthetic or conventional form.

From a pedagogical perspective, these findings have significant implications for the future of interpreter training. Traditional curricula often treat note-taking as a skill exclusive to consecutive interpreting. However, this study argues for the integration of “booth-based symbolic notation” into simultaneous interpreting pedagogy. Training students to visually map logical connectors, numerical data, and structural sequences can provide them with the necessary “mental scaffolding” to navigate complex source texts with greater confidence and precision.

In conclusion, as the demand for high-speed, technical simultaneous interpreting continues to grow in international forums, the mastery of symbolic compression becomes a hallmark of professional excellence. While this study focused on a specific set of language pairs and professional backgrounds, the universal nature of cognitive load suggests that these findings are broadly applicable across the field of translation studies. Future research should continue to explore the neurocognitive interfaces of visual-auditory integration, potentially utilizing eye-tracking or neuroimaging technologies to further decode the silent, symbolic language of the interpreting booth.

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