



# Adapting Translation Units for Traffic Texts: Strategies for Clarity, Accuracy, and Cultural Alignment

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## Abstract

Translation units play a vital role in ensuring accurate and effective communication in traffic texts, especially within multilingual and multicultural transportation systems. This study investigates the identification and application of translation units in various traffic-related documents, including road signs, public announcements, and informational brochures. Using a mixed-methods approach, the research evaluates different translation strategies, focusing on their effectiveness in maintaining linguistic accuracy, clarity, and cultural adaptation. Data were collected from traffic texts across multiple languages and analyzed through both quantitative assessments and interviews with professional translators. The findings reveal that adaptive and paraphrasing strategies are most successful in achieving clear and culturally appropriate commands, while literal translation is effective mainly for simple, universal commands. This study concludes that translators need a flexible, context-based approach to accurately convey messages in traffic texts. Future research should further explore translation units in diverse languages and cultural contexts to enhance safety and communication in global transport systems.

## Keywords

Translation Units; Traffic Texts; Translation Strategies; Linguistic Accuracy; Cultural Adaptation

## 1. Introduction

### 1.1 Background

In the globalized world, transportation systems are not only functional networks but also crucial communication channels. Effective communication within these systems ensures public safety, guides travelers, and facilitates seamless navigation across different regions. Traffic texts, which include road signs, public announcements, informational leaflets, and digital displays, are central to this communication. As international travelers and diverse linguistic groups navigate these systems, accurately translated texts are essential to prevent confusion and ensure compliance with safety instructions.

Translating traffic texts presents unique challenges due to their brevity, directness, and need for immediate comprehension. Unlike literary or academic texts, which allow for interpretive flexibility, traffic texts demand precision and functional equivalence. For instance, a road sign reading "Yield to pedestrians" must be understood both linguistically and culturally, aligning with local traffic norms and pedestrian behaviors.

The concept of translation units is fundamental in this context. Defined as the smallest segment of a text that can be translated meaningfully and independently, translation units are particularly relevant for traffic texts. In these texts,

translation units can be single words (e.g., “Stop”), phrases (e.g., “No U-turn allowed”), or entire sentences (e.g., “No parking between 9 AM and 5 PM”). Identifying appropriate translation units is critical for maintaining the clarity and functionality of the message, as the choice of unit influences both linguistic accuracy and cultural adaptability.

## 1.2 Problem Statement

While the concept of translation units is well-documented in general translation studies, its specific application to traffic texts has not been thoroughly explored. Existing research tends to focus on broader translation challenges, such as cultural adaptation and linguistic accuracy, without considering the distinct characteristics of traffic texts. These texts, being brief, directive, and context-dependent, require specialized translation approaches.

Translators face unique challenges in traffic texts, balancing the need for literal accuracy with cultural sensitivity. For instance, a literal translation may work well for simple signs like "Exit" or "Stop," but complex instructions like "Yield to pedestrians during rush hour" may require adaptation to fit local cultural contexts. Failure to consider these nuances can lead to misinterpretation, potentially compromising safety and navigation.

This study addresses these gaps by investigating how translation units are identified and applied in traffic texts. It focuses on both linguistic and cultural factors to understand how different strategies affect the clarity and effectiveness of translated messages in traffic contexts.

## 1.3 Research Objectives

The main objectives of this study are:

- (1) **To analyze the characteristics of translation units** in traffic texts and their role in ensuring clear and effective communication across languages.
- (2) **To evaluate the effectiveness of different translation strategies** (literal translation, adaptation, and paraphrasing) when applied to traffic texts in various languages.
- (3) **To provide practical recommendations** for translators working with traffic texts, focusing on strategies that ensure both linguistic accuracy and cultural appropriateness.

This study aims to contribute to the body of knowledge in translation studies by expanding the understanding of translation units in specialized texts like traffic texts. It also seeks to offer practical solutions for translators, policy-makers, and transportation authorities, ultimately improving communication within global transportation systems.

## 1.4 Research Significance

This study holds both theoretical and practical significance:

- **Theoretical Significance:** In translation studies, translation units are key to understanding how meaning is conveyed across languages. By focusing on a specialized form of text—traffic texts—this study enriches the theoretical framework of translation units, showing how they can be adapted to achieve clarity and functional equivalence. It contributes to functionalist translation theories, such as Skopos theory, which emphasizes the purpose and function of translations. This study provides a nuanced understanding of how translation units can fulfill specific communicative goals, such as safety and clear guidance in traffic contexts.
- **Practical Significance:** For translators, transportation officials, and policymakers, this study offers practical guidelines for translating traffic texts. It highlights the need for flexible translation strategies responsive to both linguistic and cultural contexts. The recommendations can improve communication in multilingual transport networks, ensuring that translated texts are not only accurate but also easily understood by diverse users. Effective translation can enhance public safety, improve user experience, and promote inclusivity in global transport systems.

## 1.5 Structure of the Paper

The remainder of this paper is organized as follows:

- **Section 2** reviews relevant literature on translation units and strategies, focusing on their application to traffic texts.
- **Section 3** details the methodology, including the mixed-methods approach used to collect and analyze data on translation units in traffic texts.
- **Section 4** presents the findings, offering both quantitative and qualitative insights into the effectiveness of

different translation strategies.

- **Section 5** discusses the implications of the findings for translation studies and traffic communication.
- **Section 6** concludes the paper by summarizing the main findings, offering recommendations for future research, and suggesting practical applications for improving translation in traffic contexts.

## 2. Literature Review

### 2.1 Translation Units in Translation Studies

Translation units are a foundational concept in translation studies, serving as the smallest segment of text that can carry meaning independently. Scholars, including Vinay and Darbelnet (1995) and Newmark (1988), have extensively discussed translation units, emphasizing their flexibility and context dependency. In general translation practice, translation units can range from words to phrases, clauses, or even entire sentences, depending on the type of text, the target language, and the translation's intended function.

Recent studies, such as those by Zheng (2019), have provided further insights into how translation units are applied in specialized texts. Zheng's empirical work on English-to-Chinese translations introduces classifications like Subjective Translation Units (STU) and Objective Translation Units (OTU), highlighting the dynamic nature of translation units in practical applications. This differentiation helps explain how translators adjust their choice of translation units based on linguistic and contextual factors (Zheng, 2019).

Similarly, Chen and Liu (2021) examined translation units in public safety communication, noting the importance of adapting units to fit the target audience's cultural expectations. They found that translation units in urgent messages, such as traffic signs, must be tailored for immediate comprehension, requiring translators to prioritize clarity and cultural relevance (Chen & Liu, 2021).

### 2.2 Characteristics of Traffic Texts

Traffic texts are a distinct genre in translation studies, marked by their brevity, directness, and need for immediate comprehension. Nord (1997) and House (2001) argue that functional equivalence is key when translating texts with practical purposes, such as traffic texts. Nord emphasizes that translated messages must retain the same function as the original, even when the phrasing changes. This is critical for texts like "No U-turn allowed," which must not only prohibit the action but also clearly communicate the restriction to diverse audiences.

Zheng (2019) also emphasizes the importance of dynamic translation units in traffic texts, noting that translators frequently shift from lexical to sentential units depending on the context and the target audience's short-term memory and comprehension capacity. This aligns with functionalist theories, like Skopos theory, which prioritize the intended function of the text (Zheng, 2019).

### 2.3 Translation Strategies for Traffic Texts

Traffic texts typically employ three main translation strategies: literal translation, adaptation, and paraphrasing. Each strategy has its strengths and limitations, depending on the characteristics of the text and the cultural context of the target audience.

#### 2.3.1 Literal Translation

Literal translation involves converting the source text word-for-word, preserving the original structure as closely as possible. This strategy is often used for simple and universal commands, such as "Stop" or "Exit," where direct equivalence is possible. Newmark (1988) notes that literal translation is most effective when the source and target languages share similar syntactic structures, which is common in straightforward traffic signs.

Zheng (2019) observes that literal translation is generally sufficient for clear, simple messages but may lack effectiveness in culturally nuanced contexts, where adaptation or paraphrasing might be needed to maintain clarity (Zheng, 2019).

#### 2.3.2 Adaptation

Adaptation modifies the source text to fit cultural norms and expectations in the target language. It is necessary when literal translation fails to convey the intended meaning accurately. For example, Chen and Liu (2021) found that

adaptation is crucial for translating culturally specific instructions like “Yield to pedestrians,” as the concept of yielding varies across cultures (Chen & Liu, 2021).

Zheng (2019) also underscores the need for adaptation in translating dynamic translation units, especially in directive texts like traffic signs, where compliance depends on cultural alignment (Zheng, 2019).

### 2.3.3 Paraphrasing

Paraphrasing involves rephrasing the original message to improve comprehensibility for the target audience. Recent studies by Wu and Zhang (2022) indicate that paraphrasing is effective for translating complex instructions in traffic texts, ensuring functional equivalence and cultural adaptation (Wu & Zhang, 2022).

## 2.4 Research Gaps

Despite advances in translation studies, there is limited research on the application of translation units in specialized texts like traffic texts. Zheng (2019) highlights the need for further investigation into how translation units function in specific contexts, particularly in brief and directive messages like traffic texts. Additionally, Chen and Liu (2021) identify a gap in understanding the effectiveness of different translation strategies in maintaining clarity and cultural adaptation in traffic texts (Chen & Liu, 2021).

## 3. Research Methodology

### 3.1 Research Design

This study employs a **mixed-methods approach**, integrating both quantitative and qualitative methods to provide a comprehensive understanding of how translation units are applied in traffic texts. The mixed-methods approach is ideal for analyzing both the linguistic outcomes (accuracy, clarity) and translators’ perspectives (decision-making, cultural adaptation).

The quantitative component focuses on evaluating the effectiveness of different translation strategies in maintaining functional equivalence across languages, while the qualitative component explores translators' experiences and perceptions when working with traffic texts.

### 3.2 Participants

The study involves 30 professional translators with at least 3 years of experience in translating traffic-related texts. The participants are selected based on their expertise in translating public safety information and their familiarity with different translation strategies (literal, adaptive, paraphrasing).

- **Demographics:** The translators come from diverse linguistic backgrounds, covering English, Spanish, French, Chinese, and Arabic, to ensure a broad perspective on cultural adaptation.
- **Selection Criteria:** Translators were chosen based on their experience working in multilingual transportation networks or translating public service announcements and road signage.

### 3.3 Data Collection

#### 3.3.1 Traffic Text Samples

Data were collected from various sources, including government transportation agencies, public service websites, and international road safety organizations. The sample-set includes:

- **Road Signs:** Simple signs (e.g., "Stop," "Yield"), complex signs (e.g., "No U-turn during peak hours"), and digital display messages (e.g., "Wear seat belts at all times").
- **Public Announcements:** Recorded and written messages used in public transportation systems, such as metro announcements or bus station warnings.

#### 3.3.2 Translation Quality Assessment

The traffic text samples were translated by the participating translators using three main strategies: literal translation, adaptation, and paraphrasing. Each translation was evaluated based on three criteria:

- (1) **Accuracy:** Correctness of the translated text in conveying the original message.
- (2) **Clarity:** The level of comprehensibility and ease of understanding for the target audience.
- (3) **Cultural Adaptation:** The effectiveness of the translation in aligning with local cultural norms and behaviors.

Each criterion was rated on a 5-point scale, with 1 being the lowest and 5 the highest.

### 3.3.3 Interviews with Translators

Semi-structured interviews were conducted with 15 translators to gain qualitative insights into their translation processes and strategies. The interview questions focused on:

- How translators identify translation units in traffic texts.
- The challenges they encounter in achieving functional equivalence and cultural adaptation.
- Their preferred translation strategies for different types of traffic texts.

## 3.4 Data Analysis

### 3.4.1 Quantitative Analysis

The translated texts were analyzed quantitatively using the scores from the translation quality assessment. Statistical tests such as ANOVA were conducted to compare the effectiveness of different translation strategies (literal, adaptation, paraphrasing) across the three criteria (accuracy, clarity, and cultural adaptation).

### 3.4.2 Qualitative Analysis

Interview transcripts were analyzed using thematic analysis to identify recurring themes related to translation strategies, decision-making processes, and cultural adaptation challenges. The analysis aimed to uncover the underlying factors that influence translators' choices of translation units and strategies.

## 3.5 Ethical Considerations

The study adheres to ethical guidelines for research involving human participants. Informed consent was obtained from all translators before participation, ensuring their voluntary involvement and confidentiality of responses. All collected data were anonymized and used solely for research purposes.

## 4. Results

The "Results" section presents findings from both the quantitative and qualitative analyses, focusing on how different translation strategies affect the accuracy, clarity, and cultural adaptation of traffic texts.

### 4.1 Quantitative Results

#### 4.1.1 Translation Quality Assessment

The quantitative analysis evaluates the effectiveness of three translation strategies—literal translation, adaptation, and paraphrasing—across three criteria: accuracy, clarity, and cultural adaptation. The following table summarizes the average scores for each strategy:

**Table 1. Average Scores for Translation Strategies Across Criteria**

Translation Strategy	Accuracy (Mean Score)	Clarity (Mean Score)	Cultural Adaptation (Mean Score)
Literal Translation	4.5	3.8	2.9
Adaptation	4.3	4.6	4.7
Paraphrasing	4	4.4	4.5

- **Accuracy:** Literal translation scored the highest in accuracy, with an average score of 4.5. This indicates that literal translations are effective in maintaining the original meaning, especially for simple traffic signs like "Stop" or "Exit."
- **Clarity:** Adaptation performed best in clarity, with a mean score of 4.6. This suggests that adapting the message to fit local linguistic norms enhances understanding, particularly for more complex instructions like "Yield to pedestrians during peak hours."
- **Cultural Adaptation:** Adaptation also scored the highest in cultural adaptation, with an average score of 4.7. This confirms that modifying translations to align with local customs and behaviors is essential for effective communication in traffic contexts.

#### 4.1.2 Statistical Analysis

Statistical tests, specifically ANOVA, were conducted to determine the significance of differences between the translation strategies across the three criteria: accuracy, clarity, and cultural adaptation. The results are summarized in Table 2, showing which comparisons were statistically significant.

**Table 2. Statistical Analysis Results (ANOVA)**

Criteria	Comparison	<i>P</i> -value	Significance
Accuracy	Literal vs. Adaptation	> 0.05	Not significant
Clarity	Literal vs. Adaptation	< 0.05	Significant
Cultural Adaptation	Adaptation vs. Paraphrasing	< 0.05	Significant

The results show that:

- There is a statistically significant difference ( $P < 0.05$ ) between literal translation and adaptation in terms of clarity and cultural adaptation.
- Adaptation and paraphrasing did not show significant differences in accuracy but differed significantly in cultural adaptation, with adaptation slightly outperforming paraphrasing ( $P < 0.05$ ).

These results indicate that while literal translation maintains linguistic accuracy, adaptation, and paraphrasing are more effective in ensuring both clarity and cultural relevance.

## 4.2 Qualitative Results

### 4.2.1 Translator Perspectives

The qualitative analysis, based on interviews with 15 translators, reveals several insights into the challenges and strategies associated with translating traffic texts:

- **Identification of Translation Units:** Most translators noted that they often shift between lexical and sentential translation units, depending on the complexity of the message and the target language's syntactic structure. For instance, a single word like "Stop" is treated as a lexical unit, while longer instructions, such as "No U-turn allowed between 8 AM and 6 PM," are approached as sentential units to preserve the message's function.
- **Cultural Adaptation Challenges:** Translators highlighted that cultural adaptation is often the most challenging aspect of translating traffic texts. One translator mentioned, "Certain instructions, like 'Yield to pedestrians,' require not just linguistic changes but also a consideration of local traffic behaviors, which differ widely across countries." This reinforces the quantitative finding that adaptation is crucial for effective communication.
- **Preferred Strategies:** Translators expressed a preference for using adaptation when dealing with complex instructions, as it allows for more flexibility in maintaining functional equivalence. However, they also noted that literal translation is often sufficient for simple, universally understood signs.

### 4.2.2 Recurring Themes

Three main themes emerged from the qualitative analysis:

- (1) **Functional Equivalence:** Achieving functional equivalence was emphasized as the primary goal in translating traffic texts, guiding translators' choices of units and strategies.
- (2) **Cultural Sensitivity:** Cultural adaptation was viewed as essential for compliance and understanding, particularly in multilingual transportation networks.
- (3) **Dynamic Use of Translation Units:** Translators frequently shift between different sizes of translation units to ensure the message's clarity and effectiveness, supporting the theoretical perspective of dynamic translation units.

## 5. Discussion

### 5.1 Interpretation of Findings

#### 5.1.1 Accuracy, Clarity, and Cultural Adaptation

The findings from this study indicate that while literal translation maintains the highest level of linguistic accuracy,

it is less effective in terms of clarity and cultural adaptation. This result aligns with Zheng (2019), who found that literal translation often struggles to convey culturally nuanced messages in directive texts like traffic signs. Literal translation is most effective for simple, universally understood commands (e.g., "Stop," "Exit"), where linguistic equivalence is sufficient for clear communication.

In contrast, adaptation emerged as the most effective strategy in achieving both clarity and cultural alignment. This finding supports Chen and Liu (2021), who emphasize that adaptation is crucial for translating public safety messages in contexts where cultural norms vary significantly. By adjusting the language to match local behaviors and conventions, adaptation ensures that the translated message retains its functional purpose, enhancing comprehension and compliance.

Paraphrasing also proved to be effective in improving clarity, particularly for more complex instructions. However, it scored slightly lower than adaptation in cultural adaptation. This aligns with Wu and Zhang (2022), who suggest that while paraphrasing helps simplify complex messages, it may not always fully align with cultural expectations unless paired with adaptive strategies.

### 5.1.2 Translator Preferences and Strategies

The qualitative findings reveal that translators prefer using adaptation over literal translation when translating complex traffic texts. This preference is based on the flexibility adaptation offers in achieving functional equivalence. The interviews also highlighted the dynamic nature of translation units, as translators frequently shift between different units to maintain clarity and context-specific meaning. This observation supports Zheng's (2019) theory of dynamic translation units, which posits that the choice of units should adapt to both linguistic and cultural factors.

Additionally, the emphasis on cultural adaptation aligns with Skopos theory, which prioritizes the function and purpose of the translated text. Translators' focus on achieving functional equivalence in traffic texts demonstrates a practical application of this theory, emphasizing the need for translations to be effective in their specific contexts.

## 5.2 Comparison with Existing Literature

The study's findings align with existing research on translation units and strategies in public safety communication:

- **Vinay and Darbelnet (1995)** argue that translation units are flexible and context-dependent, a notion supported by the translators' dynamic use of units in this study.
- **Nord (1997)** emphasizes functional equivalence in specialized texts, a principle that was central to translators' decision-making processes when translating traffic texts.
- **Chen and Liu (2021)** highlight the importance of adaptation in achieving cultural alignment in public safety messages, a key finding in this study as well.

However, this study contributes additional insights by focusing specifically on traffic texts, a relatively underexplored area within translation studies. It also provides empirical evidence of how different strategies perform across linguistic, clarity, and cultural criteria, offering a more detailed understanding of how translation units function in practical applications.

## 5.3 Implications for Translation Practice

### 5.3.1 Practical Recommendations

The findings suggest several practical recommendations for translators working with traffic texts:

- (1) **Adopt a Flexible Approach:** Translators should be prepared to use different translation strategies, shifting between literal translation, adaptation, and paraphrasing as needed to achieve functional equivalence.
- (2) **Prioritize Cultural Adaptation:** In contexts where cultural differences significantly affect message interpretation, adaptation should be the primary strategy to ensure compliance and understanding.
- (3) **Focus on Dynamic Translation Units:** Translators should recognize the dynamic nature of translation units and adjust their choices based on text complexity, cultural norms, and the target audience's linguistic background.

### 5.3.2 Policy and Implementation

For policymakers and transportation authorities, the study highlights the need for standardized guidelines that emphasize cultural adaptation in translating public safety information. Incorporating culturally aware translations can enhance public safety and communication, particularly in multilingual transportation systems.

## 5.4 Limitations and Future Research

### 5.4.1 Limitations

While this study offers valuable insights into the translation of traffic texts, it has several limitations:

- **Limited Sample Size:** The study involved 30 translators, which may not fully represent the diversity of translators' experiences across different linguistic backgrounds.
- **Focus on Select Languages:** The analysis was limited to five languages (English, Spanish, French, Chinese, Arabic), which restricts the generalizability of findings across other languages and cultures.
- **Short-Term Evaluation:** The study focused on immediate comprehension and effectiveness, without assessing long-term retention or behavioral changes related to translated traffic messages.

### 5.4.2 Future Research Directions

To build on these findings, future research should:

- (1) **Expand Language Scope:** Include more diverse languages to explore how translation units function across different linguistic systems.
- (2) **Conduct Longitudinal Studies:** Assess the long-term impact of translated traffic texts on compliance and safety behaviors.
- (3) **Integrate Technology:** Investigate the role of machine translation and AI-assisted tools in translating traffic texts, particularly in terms of accuracy and cultural adaptation.

## 6. Conclusion

### 6.1 Summary of Key Findings

This study examined how different translation strategies—literal translation, adaptation, and paraphrasing—affect the translation of traffic texts, focusing on three key criteria: accuracy, clarity, and cultural adaptation. The findings indicate that:

- (1) **Literal Translation** is most effective in maintaining linguistic accuracy for simple commands (e.g., “Stop,” “Exit”) but less effective in terms of clarity and cultural adaptation.
- (2) **Adaptation** emerged as the most effective strategy overall, achieving both clarity and cultural alignment. It allows translators to modify messages to fit local linguistic norms and cultural expectations, ensuring functional equivalence.
- (3) **Paraphrasing** was found to be useful in simplifying complex instructions and enhancing clarity, but slightly less effective than adaptation in achieving cultural adaptation.

These results suggest that effective translation of traffic texts requires a flexible, context-based approach that adapts to the text's function, linguistic structure, and cultural context.

### 6.2 Contributions to Translation Studies

This study contributes to translation studies by providing empirical insights into the application of translation units in a specialized text type—traffic texts. It expands the understanding of translation units, supporting the notion that they are dynamic and adaptable to context-specific requirements. The findings also reinforce functionalist translation theories, such as Skopos theory, demonstrating their practical relevance in translating directive and safety-related texts.

### 6.3 Practical Recommendations

Based on the study's findings, the following practical recommendations are proposed:

- (1) **Use Adaptive Strategies:** Translators should prioritize adaptive strategies, especially when translating complex or culturally sensitive traffic texts, to ensure both clarity and compliance.
- (2) **Employ Dynamic Translation Units:** Translators should shift between different translation units—lexical, phrasal, or sentential—depending on the complexity of the message and the target audience's linguistic background.
- (3) **Develop Standardized Guidelines:** Transportation authorities should establish standardized guidelines that emphasize cultural adaptation in translating public safety information to improve comprehension and compliance in multilingual transportation systems.



## 6.4 Future Research Directions

The study identifies several directions for future research:

- (1) **Explore Diverse Languages and Cultures:** Future research should expand the language scope to include more diverse linguistic and cultural contexts, providing a broader understanding of how translation units function globally.
- (2) **Assess Long-Term Impact:** Conduct longitudinal studies to evaluate how translated traffic texts influence long-term comprehension and behavioral compliance in different transportation environments.
- (3) **Integrate AI and Machine Translation:** Examine the role of AI-assisted translation tools in handling translation units and achieving cultural adaptation, particularly in real-time traffic communication.

## 6.5 Final Remarks

This study reaffirms the importance of translation units in achieving clear, accurate, and culturally appropriate communication in traffic texts. It highlights the need for flexible and adaptive translation strategies, emphasizing that effective translation goes beyond linguistic accuracy to include cultural sensitivity. As global transportation networks continue to grow, ensuring effective communication through well-translated traffic texts becomes crucial for public safety, compliance, and user experience.

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