An In-Depth Study of the Linguistic Landscape within Xi'an's Metro System and Its Role in Shaping Urban Identity and Accessibility

Xinyue Zhang and Jie Gao*

School of Foreign Languages, Northwestern Polytechnical University, Xi'an, Shaanxi, China
Email: zhangivy@mail.nwpu.edu.cn (X.Y.Z.); gaojie@nwpu.edu.cn (J.G.)
*Corresponding author
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***Abstract*—In response to Xi'an's accelerating internationalization and expanding rail transit network, this paper examines the linguistic landscape within its metro system. Using Ron Scollon & Suzie Wong Scollon's place semiotics theory, we analyze the social meanings embedded in the metro's material space, focusing on code preference, inscription, and emplacement. Through a mixed-methods approach, including fieldwork and textual analysis, we collected data from major Xi'an metro lines. The study aims to provide a theoretical foundation and practical recommendations for the design and management of urban rail transit linguistic landscapes in Xi'an and beyond, contributing to the broader field of urban linguistic landscape research.**

***Keywords*—linguistic landscape, place semiotics theory, code preference, inscription, emplacement**

I. Introduction

The globalization surge has propelled the internationalization of cities worldwide, including Xi'an, a historic yet modernizing Chinese city. The expansion of Xi'an's rail transit system has created a diverse linguistic landscape, mirroring its evolving cultural and societal shifts.

This paper aims to explore the linguistic landscape of Xi'an's rail transit system, examining its current state, functions, and cultural values within the context of the city's internationalization. To achieve this, the research employs the place semiotics theory, as advanced by Ron Scollon & Suzie Wong Scollon [1], which offers a framework for understanding the social meanings embedded in the material space of urban transit.

A mixed-methods approach, incorporating fieldwork and textual analysis, is employed to examine the linguistic landscape's elements: code preference, inscription, and emplacement. The research aims to provide theoretical insights and practical recommendations for linguistic landscape management in urban rail transit systems, applicable to Xi'an and other cities undergoing similar internationalization and urban growth.

II. Literature Review

The linguistic landscape represents not only an innovative method but also a totally new perspective from which to study multilingualism in human society [2]. The linguistic landscape is the application of written language in public space, which includes the signs and signboards on streets and in government buildings and shops [3, 4]. The concept "linguistic landscape" was first put forward by Landry and Bourhis (1997). Since then, this concept has been widely accepted and has become a new popular area of sociolinguistic research.

In general, the linguistic landscape has two major functions: an informative function and a symbolic function [5]. It reflects the relative power and status of the linguistic communities inhabiting the area. The information function is fundamental. Language on public signs informs communication and services. The symbolic function is relatively complementary, as language can reflect social status and the relationship between authorities and local residents [6]. Besides, Linguistic signs are the main research object of linguistic landscape, and linguistic signs could be categorized into two types, official signs (top-down) and private signs (bottom-up).

With the deepening of urbanization, more and more cities have entered the era of urban railways, and the linguistic landscape of urban railways is an important way of transport information transmission [7]. For this reason, some scholars in China have investigated the linguistic landscape of rail transit on the basis of the previous research. Scholar Xu studied the linguistic landscape of Shenyang transportation field from the perspective of translation strategy [8]. Scholar Xia Le conducted a study on the linguistic landscape of urban rail transit in Hefei using the theory of place semiotics [9]. In terms of the semiotics of place theory, scholar Zeng Xiaohong conducted a study on the linguistic landscape based on Line 4 of the Shanghai Metro [10], and scholars Cui Le and Creonie conducted a study on the linguistic landscape of urban rail transit in Xi'an [11]. Previous studies on linguistic landscapes have used different methods, with some focusing on translation and others on the theory of place semiotics. However, these studies have been limited because they only looked at a few samples and didn't use fieldwork to gather more. This study aims to overcome these limitations by using fieldwork to collect a wide range of samples from the rail transit linguistic landscape in Xi'an. It then uses the theory of place semiotics to analyze these samples, hoping to provide a deeper understanding of the language used in public transportation spaces. Following are the research questions of this paper.

(1) What are the dominant patterns of code preference, inscription, and emplacement within the linguistic landscape of Xi'an's metro lines, and what do these patterns reveal about the status and relationships of languages used?
(2) How can the findings from this study inform the design and management of linguistic landscapes in other urban

rail transit systems, particularly in the face of internationalization and urban development challenges?

III. Methodology

A. Sample Collection Method

This paper adopts the field research method to study the linguistic landscape of urban rail transit in Xi'an. Combining the research purpose of this paper and the actual situation of operation of urban rail transit in Xi'an, the linguistic landscapes of the five subway lines with a large number of commuters in Xi'an were collected, and the corpus was collected by taking pictures with HUAWEI MATE 60pro.

B. Scope of Sample Collection

The research object of this paper is the linguistic landscape of urban rail transit in Xi'an, taking into account the opening of urban rail transit in Xi'an, which has opened 9 subway lines and some trial operation light rail lines. According to the daily passenger flow data released by the official social media account of Xi'an Metro Operation from March to June 2024, Line 2 consistently recorded the highest ridership with an average daily volume of 1 million passengers. Following closely, Line 3 saw 750,000 passengers per day, while Line 1 had 650,000 daily riders. The subsequent lines in descending order of passenger volume were Line 4, Line 6, Line 5, Line 9, Line 14, and Line 16. For this study, we have selected the busiest lines—Line 1, Line 2, and Line 3—as well as Lines 6 and 9, which both commenced operations during the same period in 2020. The linguistic landscape of this research is the official linguistic landscape, including station names, signage, warning signs, and official metro messages.

C. Quantity of Sample Collection

During the field survey, a total of 107 photographs were taken. Among the five metro lines, repeated linguistic landscape signs at various stations were not counted as new; identical ones were considered as one instance only. After careful calculation, a total of 221 valid official linguistic landscapes within Xi'an Metro stations were collected. These 221 official linguistic landscapes across the five metro lines were categorized based on their purposes into four types: location-related, advisory, safety slogans, and fire safety. Specifically, there were 159 linguistic landscapes related to locations, including 128 station names, 2 interior carriage location names, 11 subway station interior names, and 18 surrounding area names around the subway stations. There were 25 linguistic landscapes under the advisory category. Fire safety-related landscapes numbered 15, and safety-related signage accounted for 22 instances.

IV. Findings

A. Code Preference

Currently, language signs in Xi'an Metro predominantly employ a bilingual format using both Chinese and English to convey information. However, there are instances where monolingual language signs are also present. At the level of language variety, the text on the signs primarily consists of Chinese characters, English, and Chinese Pinyin (the phonetic system for transcribing Chinese). The bilingual combinations typically involve either Chinese + English or Chinese + Pinyin, while the monolingual signs are usually in Chinese. Relevant information is detailed in Table 1. The layout primarily adopts a horizontal arrangement, with Chinese positioned at the top and English at the bottom.

Table 1. The arrangement of channels

Language Type	Location	Advisory	Fire safety	Safety	Number	%
Mono-language (Chinese)	0	0	2	0	2	0.9%
Bilanguage (Chinese+ English)	18	25	13	22	78	35.3%
Bilanguage (Chinese+ Pinyin)	141	0	0	0	141	63.8%

The layout primarily adopts a horizontal arrangement. In the bilingual combination of Chinese + English, the Chinese text is positioned at the top, with English at the bottom. In the bilingual combination of Chinese + Pinyin, the Chinese characters are placed at the top, and the Pinyin is situated at the bottom. The examples are shown in Figs. 1 & 2.

According to scholar Wu Lisha, in horizontal layouts, the more critical code is positioned at the upper part of the sign, while the relatively less important code is placed at the bottom of the sign [12]. According to Articles 13 and 14 of the Law of the People's Republic of China on the General Language and Writing System, the standardized Chinese characters shall be used as the basic service characters in the public service industry, and the characters used in public places shall be used in the State's general language and writing system as the basic language and writing system. According to the picture provided, both types of bilingual signage are legally required to feature Chinese as the primary language, with the Chinese text prominently placed at the top as critical code, while pinyin and English serve as supplementary explanations located at the bottom.

In accordance with the visual design grammar proposed by Kress & Leeuwen, various elements possess different values due to their positions in space: the left side represents known information, while the right side signifies new information [13]. As shown in Fig. 1, we can observe that the image symbol for the station is positioned on the left side, while the specific name of the station, serving as new information, is placed on the right side.

Fig. 1. The language sign of Chinese + Pinyin.

Fig. 2. The language sign of Chinese + English.

B. Inscription

The interpretation of linguistic landscapes is also reflected through the aspects of inscription, including the material, font, additional components, and the state changes of the inscriptions. These distinctions on the inscriptions enable the effective transmission and interpretation of the information conveyed by linguistic signs.

In terms of typography, for location linguistic landscape, the Xi'an Metro's Language sign predominantly uses bold black fonts, which visually appear clearer, allowing passengers to promptly receive useful information. The example of black font is shown in Fig. 3. Additionally, regarding advisory linguistic landscape, some signs employ dark colored backboards with white fonts, which can attract passengers' attention more effectively than regular black. The example of colored backboards with white fonts is shown in Fig. 4. For safety and fire safety landscape, red patterns are commonly used, along with red backboards paired with white fonts. The color red serves to alert passengers to safety-related matters that require heightened attention. The example of red backboards with white fonts is shown in Figs. 5 & 6.

Fig. 3. The black fonts of location signs.

Fig. 4. The white fonts of advisory signs.

Table 2. The color of language signs in Xi'an metro

Language Type	Location	Advisory	Fire safety	Safety	Number	%
Black fonts	139	7	2	8	156	70.6%
Colored backboards with white fonts	20	18	1	0	39	17.6%
Red backboards with white fonts	0	0	12	14	26	11.8%

In the realm of inscriptions, certain signs also fully convey their meanings through additional components or state changes, particularly evident in the arrival notifications within train carriages. For instance, in the subway trains of Line 6 and Line 9, which began operation in the same year 2022, the direction of door opening and the information about the arriving station are displayed repeatedly with a blinking effect on the screens at specific moments. On the older Line 2 trains that were put into service earlier, this effect was achieved through simple light flashing. These linguistic landscape inscriptions employ screen blinking and basic light flashing effects to draw passengers' attention to specific information.

Fig. 5. The red fonts of safety signs.

Fig. 6. The red fonts of safety signs.

C. Placement

The concept of "placement" focuses on examining the actual physical location of language signs in the real world and the meanings they carry. Specifically, place semiotics categorizes placement into three types: decontextualization, transgressive, and scenographic.

Decontextualization refers to the removal of language signs from their original context and placing them in a new environment, where their meaning may change or become ambiguous due to the lack of contextual cues. Transgressive placement involves language signs crossing boundaries, such as cultural or spatial borders, leading to hybrid meanings that combine elements from different contexts. Scenographic placement emphasizes the integration of language signs into the surrounding environment, where their meanings are closely tied to the specific setting and context in which they are placed.

Decontextualization in the Xi'an Metro linguistic landscape is evident in the way language signs are removed from their original context and placed in a new environment. For example, the use of English in signage within the metro system is a decontextualized element, as it is not the primary language spoken by the majority of passengers. However, the presence of English serves as a means to cater to the needs of international visitors and non-native speakers, providing them with essential information about station names, directions, and safety guidelines. This decontextualization of language signs helps to create a more inclusive and accessible environment for diverse user groups within the metro system. The example is shown in Fig. 7.

Fig. 7. The language sign with Chinese and English.

Scenographic placement emphasizes the integration of language signs into the surrounding environment, where their meanings are closely tied to the specific setting and context in which they are placed. In the Xi'an Metro, this can be observed in the strategic placement of signs at key decision points, such as platform entrances, escalators, and transfer corridors. By situating language signs in these locations, the metro system ensures that passengers receive timely and relevant information, facilitating smooth navigation and orientation within the transit network. The examples are shown in Figs. 8 & 9.

Fig. 8. The language sign in transfer corridors.

Fig. 9. The language sign with Chinese and English.

V. Discussion

A. Problem

Based on previous analysis, there are some problems in Xi'an metro's linguistics landscape. Firstly, in fire safety aspect, there are instances of monolingual signs in Chinese. The example is shown in Fig. 10. Despite the presence of these linguistic landscapes accompanied by operational examples in the form of images, they remain less than optimal for non-native Chinese speakers in emergency situations.

Fig. 10. The language sign with Chinese and English.

B. Suggestions

According to the problems, First of all, expand the use of multilingual signs to include more languages, especially those spoken by significant visitor populations, to make the metro more accessible and inclusive. Secondly, While the use of bold black fonts for location signs, colored backboards with white fonts and red for safety signs is effective, there is a need for more variation in typography and color to enhance the visibility and attractiveness of the signs. Thirdly, there is currently a lack of mechanisms for passengers to provide feedback on issues related to the linguistic landscape. Implement mechanisms for collecting user feedback on the linguistic landscape to continuously improve the system based on passenger experiences and needs.

VI. Conclusion

The linguistic landscape of Xi'an's urban rail transit system presents a complex and diverse tapestry of languages and inscriptions, reflecting the city's rapid internationalization and modernization. Through a comprehensive analysis of code preference, inscription, and emplacement, this study has shed light on the intricate interplay of languages within the metro system, revealing patterns that underscore the status and relationships of languages used.

The predominance of bilingual signs, featuring Chinese and English, alongside instances of Chinese-Pinyin combinations, highlights the metro's efforts to cater to a diverse user base, including international visitors and non-native speakers. The strategic placement of signs at key decision points within the metro environment ensures that passengers receive timely and relevant information, facilitating smooth navigation and orientation.

However, the study also identified areas for improvement, such as the need for multilingual fire safety signs to enhance accessibility in emergency situations. Additionally, the lack of mechanisms for passenger feedback on the linguistic landscape suggests a need for continuous improvement based on user experiences and needs.

In conclusion, the linguistic landscape of Xi'an's metro system serves as a critical interface between the city's residents and visitors, conveying essential information while symbolizing the city's evolving cultural and social dynamics. By addressing the identified challenges and implementing the suggested improvements, the metro system can enhance its inclusivity and accessibility, thereby contributing to the overall user experience and the city's international image. This study not only enriches the theoretical understanding of urban linguistic landscapes but also provides practical guidance for the design and management of linguistic landscapes in rail transit systems, with implications for cities facing similar challenges of internationalization and urban development.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

Xinyue Zhang conceptualized the research idea and designed the study. She also conducted the interviews,

transcribed the recordings, and performed the initial analysis to draft the manuscript; Jie Gao provided theoretical insights and the methodology. She revised the manuscript and offered critical feedback and suggestions; both authors had approved the final version.

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