# Overcoming Language Barriers in Metro Systems: A Semiotic Analysis of the Logo Design for Xi'an Metro Line 2

**Wang Yujue[1,2*], Mat Redhuan Samsudin[1], Noorlida Daud[1]**

**[1]Universiti Teknologi MARA (UiTM) Cawangan Kelantan, Bukit Ilmu, 18500 Machang, Kelantan Darul Naim Malaysia**

**[2]College of Humanities and Arts,Xi'an International University,710077,Xi'an,Shaanxi Proverce, China**

***Corresponding Author**

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## ABSTRACT

Against the backdrop of global economic integration, overcoming language barriers has emerged as a critical issue in the design of modern public transportation systems. Grounded in the semiotic theory of "signifier" and "signified," this study examines the evolution of station wayfinding design in Chinese metro systems, highlighting the interactive relationship between signifiers and signifieds as embodied in station logos. Using the logo design of Xi'an Metro Line 2 as a case study, the paper explores the applicability of visual metaphors, multi-layered intention communication, and aesthetic balance in multilingual environments. Furthermore, it analyzes the role of station logo design in conveying cultural symbols and urban identity, shedding light on its significance in expressing regional culture and disseminating social values. Based on these insights, this study proposes visual strategies for applying logo design in cross-linguistic public transportation systems, aiming to foster broader cultural exchange and understanding.

**Keywords:** semiotics; logo design; station wayfinding; Xi' an Metro

## INTRODUCTION

According to data from the Ministry of Transport of China, as of January 2023, 54 cities across the country have established 291 urban rail transit lines, collectively handling a cumulative passenger volume of 1.47 billion trips, with 890 million station entries. The latest report published by the Xi'an Rail Transit Group in 2024 reveals that during the National Day holiday period, Xi'an Metro safely transported 35.647 million passengers, with an average daily ridership of 4.456 million—an increase of 17% compared to the same period in 2023. With the accelerated pace of global integration in the post-pandemic era, the growth of international trade, and the increasing number of domestic and international tourists, metro passenger density continues to rise. Against this backdrop, studying metro station prompt designs that overcome language barriers to meet the diverse needs of passengers has become particularly significant.

Does the visual design of station cues influence the passenger experience? Do passengers prefer textual or graphical station prompt designs? What kind of station cue design can truly transcend language barriers and serve passengers from diverse cultural backgrounds? The answers to these questions may vary depending on the context, and there is no universal solution. Some designs emphasize simplicity and clarity; others focus on the integration and preservation of cultural elements or the application of intelligent technologies. Numerous approaches can be explored, each serving a distinct purpose.

However, outstanding station prompt design must prioritize passengers' visual needs, ensuring the "legibility" of the design for a diverse passenger base. Such designs should avoid homogeneous, one-size-fits-all solutions, as well as superficial aesthetics aimed solely at capturing attention. Using the station logo design of Xi'an Metro Line 2 as a case study, this paper investigates how semiotic theories can effectively address language barriers, enhance passenger travel experiences, and achieve a harmonious coexistence between the functional and cultural dimensions of China's metro public transportation systems.

## The Evolution of Metro Station Prompt Design in China

The core objective of metro station prompt design is to assist passengers in making accurate navigational decisions within complex spatial environments while enhancing their overall travel experience through effective visual communication.This field is inherently interdisciplinary, intersecting with visual communication, cultural studies, and psychology. The evolution of metro station prompt design in China dates back to the 1970s, during the early construction phase of the Beijing Metro. At that time, the system primarily relied on textual information, forming the rudimentary structure of station prompts. Entering the 21st century, with the rise of urban cultural awareness, the development of graphical signage, exemplified by Xi' an Metro' s "One-Station-One-Logo" design, emerged.

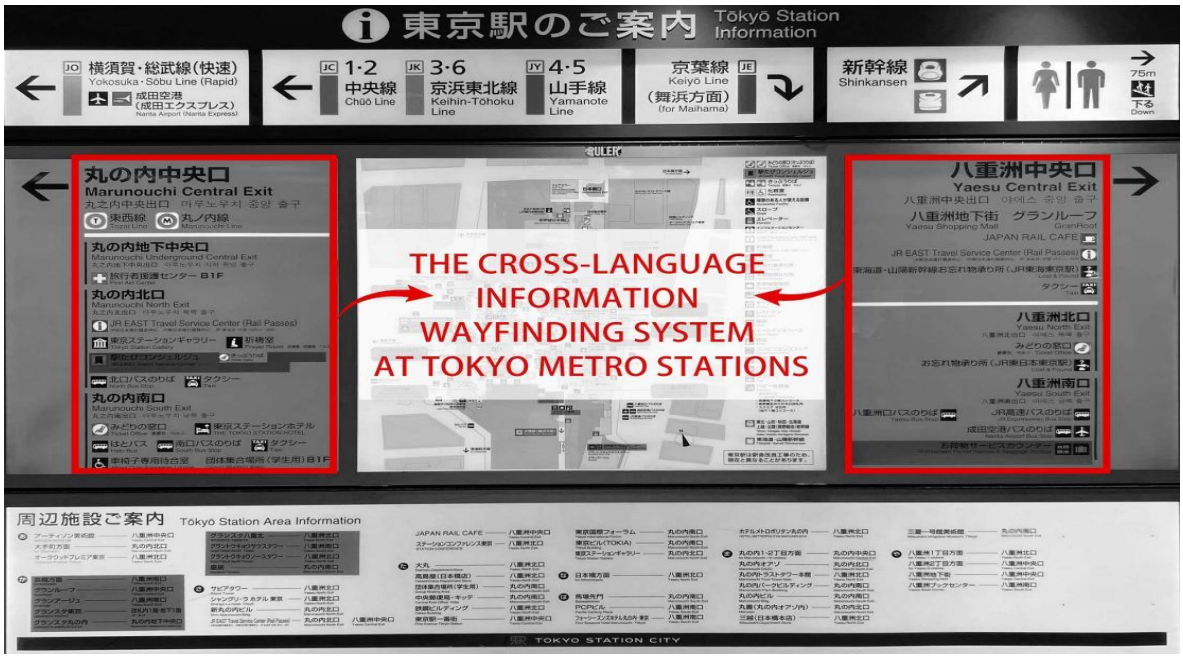
As a historical and cultural city, Xi'an attracts a large number of international tourists with its rich Eastern heritage. This design approach not only improves the travel experience of diverse passengers in cross-lingual environments but also plays a significant role in cultural dissemination. The transition of station prompt design towards prioritizing cultural expression and aesthetic value reflects the broader shift in China' s urban public transportation system from homogenization to humanization and diversification.

## The "Text-Only" Station Prompt Phase

China' s first metro line, Beijing Metro Line 1, opened in 1969. During this period, station prompts primarily relied on textual information, using simplified Chinese characters and pinyin to indicate station names and provide directional guidance. While effective for local passengers, this text-centric approach struggled to meet the needs of passengers from diverse linguistic backgrounds. For example, during the 1996 Düsseldorf Airport fire in Germany, a passenger in the Air France lounge made several emergency calls describing the location as above the Lufthansa boarding area. However, responders were unable to identify the exact location due to a lack of visual or spatial cues. This tragedy resulted in the suffocation of nearly all individuals in the lounge except one survivor, highlighting the limitations of relying solely on text-based cues in emergency scenarios. According to American psychologist Edward Chace Tolman' s concept of cognitive maps, sensory inputs such as vision and proprioception are crucial for individuals to infer their position in an environment and form mental imagery to aid navigation (Amos, 1948). Text-only prompts, however, often fail to provide sufficient sensory input, impairing passengers' ability to locate themselves within spatial contexts effectively.

With the increasing diversity of metro passengers, the growing complexity of urban environments, and the progression of urbanization, station prompt designs must accommodate not only local passengers but also those from various cultural and linguistic backgrounds. This demands both universal and personalized design approaches. For instance, Tokyo Metro in Japan has introduced multilingual textual prompts (Figure 1). Erik Spiekermann's research suggests that text-based information can be difficult for passengers to quickly interpret, particularly in fast-paced environments or emergencies. German linguist and semiotician Gunther Kress further highlights, in his multimodal discourse analysis, that textual signs are a specific form of symbol system. Users from different cultural and linguistic backgrounds may interpret the same textual information differently, leading to misunderstandings or incomplete communication, especially in public transportation systems or multilingual contexts (Kress & van Leeuwen, 2006).These insights reveal the inherent limitations of over-reliance on text-based prompts, which often disregard the role of other sensory inputs, thereby reducing the flexibility and effectiveness of navigational systems. Consequently, "text-only" station prompts face significant challenges in terms of rapid recognition and cross-cultural adaptability, necessitating a shift toward more inclusive and multimodal design approaches.

Figure 1 Multilingual design of Tokyo subway station prompts, Japan




(Figure 1 source：Photograph by author)

**Integrated Graphic and Text-Based "Emblem" Station Prompts**

The construction of Xi'an Metro Line 2 marked the beginning of a localized and graphic development trend in metro station prompt design. The "One-Station-One-Logo" design concept, exemplified by Xi'an, heralded a new phase in the evolution of metro station prompts in China, emphasizing personalization and cultural heritage. From the outset, Xi'an Metro adopted the design principle of "balancing functionality and aesthetics," incorporating cultural symbols and graphic elements to enhance the cultural expressiveness and recognizability of metro stations (Li & Zhang, 2014).

For instance, the emblematic design of Zhonglou Station on Line 2 surpasses text-only prompts used in stations such as Jiangxia Station in Guangzhou, Chating Station in Fuzhou, and Orange Isle Station in Changsha. It not only enhances spatial visual appeal but also aids passengers from diverse linguistic backgrounds in navigation and orientation through intuitive graphic symbols (Figure 2).

Figure 2. Comparison of "Text-Only" and "Emblematic Design" Station Prompts


(Figure 2 source：Photograph by author)

In recent years, Xi'an Metro has further refined this design concept by integrating local cultural elements with modern design, resulting in a distinctive emblem system for each metro line (Figure 3). Today, Xi'an Metro

serves not only as a vital transportation tool for residents but also as a "viral" space for showcasing the city's culture. Many visiting passengers share their experiences at various emblematic metro stations, enriching their travel experience while promoting local tourism.

Figure 3. Emblem System of Selected Xi'an Metro Stations


(Figure 3 source: https://www.justxa.com/forum.php?mod=viewthread&tid=384465)

These developments highlight how metro station visual design significantly influences passenger experience. Well-conceived station prompt designs can evoke a sense of surprise and enjoyment, whereas homogenized designs may lead to boredom or even negative emotions. The popularity of passengers taking photos at emblematic Xi'an Metro stations demonstrates a preference for prompts that integrate graphic symbols.

According to the visual perception theory of renowned aesthetician and psychologist Rudolf Arnheim, the simplicity and intuitiveness of graphic symbols enable them to convey information rapidly, an indispensable advantage in complex public spaces like metro stations (Arnheim, 1974). Additionally, Italian semiotician Umberto Eco's theories on semiotics explore how symbols are interpreted and decoded across cultures. He argued that semiotics should extend beyond linguistic signs to include graphic and other non-verbal symbols in cross-cultural communication (Eco, 1976). This underscores the critical role of graphic elements in facilitating intercultural exchanges, offering theoretical support for the promotion of graphic-based station prompt designs in Chinese cities.

**The "Signifier" and "Signified" in Emblem Design**

French semiotician Roland Barthes argued in his theory of visual rhetoric that a symbol is not merely a visual form but a multidimensional expression of culture, language, and psychology (Barthes, 1964). Swiss linguist and semiotician Ferdinand de Saussure divided a symbol into the "signifier" (the form of the symbol) and the "signified" (the meaning conveyed by the symbol). In the emblem designs of Xi'an Metro, the signifier typically manifests as specific graphics, colors, and typography, while the signified represents the urban values and cultural meanings intended by the designers to communicate to passengers.

**Analysis of the Signifiers in Emblem Design**

The station emblems of Xi'an Metro Line 2 employ innovative graphic designs, color schemes, and typography to enhance recognition and functionality in multilingual contexts.

Graphic Design: The emblems feature simple yet distinctive shapes that incorporate symbolic elements from landmarks such as Daming Palace, Zhonglou (Bell Tower), and Dayan Pagoda (Figure 4). This approach significantly enhances the distinctiveness of the emblems, transforming them into visual symbols of specific locations or cultural identities, which aid passengers from diverse linguistic backgrounds in quickly identifying station features.

Color Scheme: Differentiated color schemes are applied to various metro lines and branches, enabling passengers from different cultural and linguistic backgrounds to intuitively distinguish between lines through color-coded guidance.

Typography: The typography integrates a bold and robust Chinese Yan style script combined with Romanized pinyin. This typographic design balances aesthetics and cultural inclusivity, offering visual comfort and accessibility to passengers of various cultural backgrounds.

**Interpretation of the Signified in Emblem Design**

**Regional Cultural Signified: Expression of History and Local Identity**

Semiotic theory posits that symbols not only fulfill surface-level signifying functions but also carry profound cultural meanings. Urban identity is shaped by unique humanistic factors such as topography, climate, customs, daily activities, and decorative styles, all of which people are highly sensitive to (Ni, 2014).

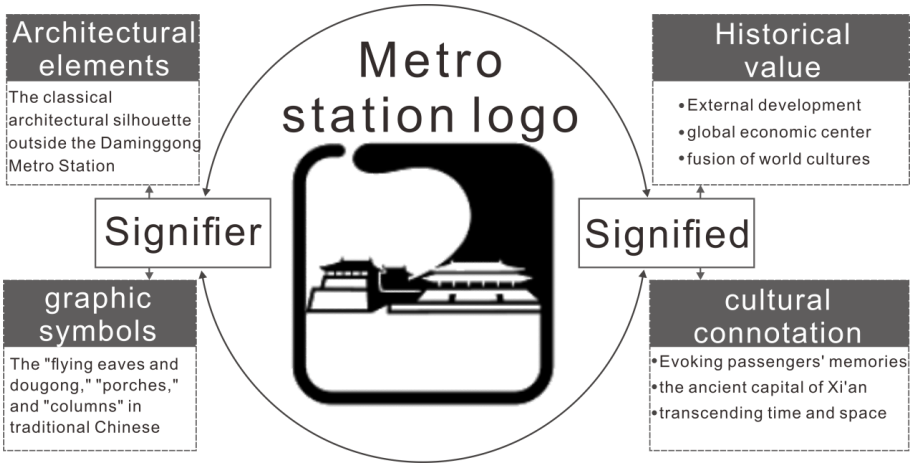
The emblem designs of Xi'an Metro incorporate straightforward yet iconic regional elements, such as ancient city gates and the Bell Tower, showcasing the city's unique cultural charm and historical depth. This design transcends language barriers, providing passengers with an emotional connection to the city's heritage during their journeys. These emblems not only enhance the city's image but also underscore its societal value by allowing passengers to experience the allure of traditional culture amidst the fast-paced urban environment.

**Social Symbolic Signified: Conveying Urban Image and Societal Values**

The appreciation and affection passengers feel toward Xi'an Metro's emblems stem from the satisfaction of their social value needs. According to Maslow's hierarchy of needs, individual desires progress from physiological needs to self-actualization. The emblem designs meet passengers' social recognition needs by presenting iconic urban landmarks. Thus, these emblems function not only as navigational aids but also as communicators of urban identity and societal values.

In a modern urban setting, individuals facing daily pressures and challenges can derive emotional relief and a sense of societal belonging through their recognition of urban symbols. The emblem designs subtly strengthen passengers' psychological sense of connection to the city, fulfilling their need for social value recognition and urban affiliation.

Figure 4. Signifier and Signified in Daminggong West Station Emblem Design




(Figure 4 Source: self-made by the researcher)

**The Application of the Interconstructive Relationship Between“Signifier”and “Signified” in Xi' an Metro Logo Design**

In semiotic theory, the "signifier" and the "signified" constitute the core dual structure of a sign, where the two are interdependent and interact to generate meaning. Ferdinand de Saussure proposed that the meaning of a sign

is conveyed not only through its physical form (the signifier) but also through the concepts or ideas it points to (the signified), thus establishing a connection with culture and context (Saussure, 1983). In the design of Xi' an Metro logos, the relationship between the "signifier" and the "signified" highlights the interconstructive nature of design elements and cultural symbols, endowing the logos with profound cultural significance that transcends their surface-level visual representation.The visual symbols (signifiers) in the logos, such as the patterns of city gates or the Bell Tower, directly reference Xi' an' s rich historical and cultural heritage (signified), evoking in passengers associations with the city' s deep-rooted traditions and historical identity. Through skillful visual design, Xi'an Metro logos not only fulfill functional requirements but also provide passengers from diverse cultural and linguistic backgrounds with a sense of cultural identity and intuitive navigation. This design approach enhances the cross-cultural communicative power of the signs and deepens the transmission of cultural meanings.

**Constructing Cultural Identity: Visual Metaphors in Logo Design**

The logo design of Xi'an Metro's Line 2 utilizes visual metaphors to construct cultural identity. These metaphors operate within the urban space by conveying deep cultural messages through intuitive visual symbols, breaking language barriers and fostering understanding and resonance among passengers of various backgrounds. Visual metaphors in these logos are often expressed through the abstraction of historical architecture, colors, and graphic symbols.A representative example is the logo design for Daminggong West Station. The design incorporates emblematic elements of Tang Dynasty architecture, such as flying eaves, dougong brackets, and roof contours. By integrating the shapes and forms of Tang palace structures, the logo symbolizes Xi' an' s profound cultural heritage as an ancient capital. The Tang cultural symbols employed in the logo are visually distinctive and easily recognizable, seamlessly blending modern commuting needs with ancient cultural imagery, offering passengers a transcendent cultural experience.This skillful application of visual metaphors not only meets the functional requirements of wayfinding but also enhances the artistic and cultural depth of metro stations. It allows passengers to experience a unique cultural journey during their daily commutes, thereby strengthening their sense of cultural identity.

**Diversification of Meaning Transmission: Interpreting Logos in Cross-Cultural Contexts**

According to Stuart Hall's cultural decoding theory, the meanings of visual symbols can vary across different cultural backgrounds (Hall, 1997). The logo design of Xi' an Metro' s Line 2 considers the needs of international passengers, employing universally comprehensible symbolic expressions while simultaneously incorporating local cultural characteristics through detailed design. This strategy not only overcomes language barriers but also fosters diverse interpretations and cultural exchange.

Taking the logo of Anyuanmen Station as an example, the design integrates the shapes of Xi' an' s ancient city walls and gate towers. Instead of directly replicating complex historical imagery, the design simplifies and abstracts the forms of the walls and towers. This abstraction ensures that the logo' s elements are presented in a universal format, enabling understanding across various cultural backgrounds. By combining historical elements with modern minimalist styles, the logo balances local cultural symbolism with a reduced level of interpretative difficulty for foreign passengers.This strategy of "cultural hybridity" aims to enhance the logo' s cross-cultural communicative capacity, ensuring that it effectively conveys information within the globalized urban environment. By harmonizing local heritage with a universally accessible design approach, the logo achieves both functional clarity and cultural resonance.

**Balancing Functionality and Aesthetics: Universality and Visual Appeal in Metro Logos**

American urban planner Kevin A. Lynch argued in The Image of the City that the design of public spaces should not only meet functional requirements but also emphasize aesthetic value to enhance a city' s visual appeal and strengthen cultural identity (Lynch, 1960). Similarly, American statistician Edward Tufte, in The Visual Display of Quantitative Information, proposed that functionality and aesthetics in design are not mutually exclusive but can complement and reinforce one another.

The logo design of Xi' an Metro' s Line 2 exemplifies this balance, particularly in its coordination of universality and visual appeal.The logo design for Yongningmen Station employs simplified yet symbolically significant

graphics of the city gate and drawbridge, effectively conveying the historical landmark's features in an intuitive manner. This enables passengers to quickly identify and remember the station, forming a stark contrast with the logo of Anyuanmen Station.In terms of functionality, the Yongningmen logo is highly recognizable and memorable, aiding passengers in efficiently navigating the metro network. From an aesthetic perspective, the graphic elements reflect the architectural style of Xi' an' s ancient city walls, preserving the solemnity of the historical structures while imbuing Yongningmen with new vitality through modern design.This design achieves a balance between functionality and aesthetics, evoking cultural associations with the city' s heritage while providing passengers with an enjoyable commuting experience.

**Visual Strategies to Overcome Language Barriers: Applications of Metro Logo Design in Multilingual Transit Systems**

In metro logo design, the use of graphic symbols is a crucial strategy for overcoming language barriers, particularly in internationalized urban transit networks such as Xi' an Metro' s Line 2. Graphic symbols, through their intuitive visual language, enable passengers from diverse cultural and linguistic backgrounds to quickly and accurately access metro information. Kress and Van Leeuwen' s multimodal theory suggests that the combination of color and shape enhances the hierarchical structure of visual information, allowing complex messages to be conveyed through simplified visual elements (Kress & van Leeuwen, 1996). This approach not only improves the efficiency of visual communication but also significantly reduces the impact of language barriers on diverse passengers, thereby enhancing the inclusiveness and usability of the metro system. The "One-Station-One-Logo" design of Xi' an Metro offers unique cultural symbols for each station, facilitating seamless navigation for passengers speaking different languages, such as English, Korean, Russian, and Japanese. By transcending age and linguistic differences, these logos establish a universal visual language.

In recent years, cities have increasingly recognized that metro stations are not only integral to transportation but also serve as platforms for promoting urban identity in the era of mobile internet (Zhao & Liu, 2020). For example, Guiyang Metro Line 3 completed the installation of its "One-Station-One-Logo" system in December 2024 (Figure 5). This marked the adoption of this graphic design concept in major cities beyond Xi' an. Guiyang Metro Line 3 integrates elements of "humanity," "architecture," and "environment" to design thematic logos reflecting the cultural and ecological characteristics of each station, creating a distinctive cultural symbol unique to Guiyang. Similarly, in 2020, Chengdu Metro introduced digital-themed logos for each line, designed based on the distinctive features of each route, passenger demographics, and operational highlights (Figure 6). This gave each metro line a unique visual identity, infusing the metro spaces with vibrancy and a sense of modernity. These efforts provide new perspectives for the future of metro visual design in China, showcasing its potential to merge functionality with urban cultural expression.

Figure 5: Logo Designs for Guiyang Metro Line 3 Stations

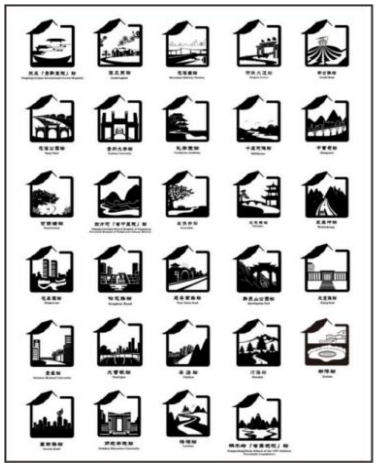



Figure 6: Logo Designs for Different Chengdu Metro Lines

(Figure 5 source: Baidu Encyclopedia)

(Figure 6 source: NetEase News, https://www.163.com/dy/article/G4SSM0LV0516838S.html)

# CONCLUSION

This study, through an in-depth analysis of the logo design for Xi' an Metro Line 2, highlights the critical role of graphical station signage in overcoming language barriers. The evolution of visual design in Chinese metro stations—from early text-based signage to the adoption of logo-based designs—reflects a natural response to the demands of internationalization and multilingual environments. It also represents a significant step toward enhancing metro system efficiency and optimizing passenger experience.

The semiotic framework of the "signifier-signified" relationship provides a robust theoretical foundation for understanding metro station logo design. By employing simple and intuitive graphic symbols, logo designs achieve efficient information transmission, demonstrating a clear advantage in cross-cultural public transportation contexts. The logo design for Xi' an Metro Line 2 effectively integrates core principles of semiotics, illustrating the practical application of graphic symbols in transcending language barriers, while enhancing the visual distinctiveness and cultural adaptability of the metro system.

The "One-Station-One-Logo" design philosophy emphasizes the use of unique visual symbols for each station. This approach not only fulfills passengers' basic information needs but also enriches their visual experience, endowing each station with a distinctive cultural identity and creating a highly engaging visual signage system. However, the "One-Station-One-Logo" approach is not without limitations. For instance, in emerging cities with relatively shallow cultural heritage, the concept may face constraints in its application. As such, the applicability of this study primarily focuses on select cities or metro lines within China.

Looking ahead, metro station logo design will continue to explore the balance between aesthetics and functionality to meet the increasingly diverse demands of urban transportation systems. In the context of globalization and integration, developing universally accessible yet culturally sensitive designs to overcome language barriers will be a key direction for future public transportation system design.

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