

Research on Urban Subway Space Design Based on Regional Cultural Elements

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Abstract: *The objective of this study is to design subway station space by integrating regional cultural elements, explore the law of urban development and user experience needs, deduce the application trend of regional culture in public space design, and promote the benign development of human society. The historical background and development status of urban subway space construction were investigated. Based on the analysis of the development of regional cultural space of individual subway stations in Xi'an, this paper studies the design ideas of regional culture mining, one station with one feature, and using subway public space to create a city name card. This paper analyzes the construction direction of subway space in the development of urban characteristics, and summarizes the necessity of reflecting the regional culture in the icon, wall, and interior decoration of station development. Regional visual elements should be injected into the construction of subway public space, and humanized design should be taken into account on the basis of the standardized function of information transmission, so as to provide a convenient and comfortable underground transportation environment for users, establish public cultural identity and sense of urban belonging through regional cultural elements, and guide the external publicity of urban image.*

Keywords: urban subway, design, cultural.

1. Introduction

The increase in the number of urban subways is conducive to alleviating the blockage of ground traffic, easing the social contradictions caused by the income gap, improving the fairness of human social development, and bringing welfare to the overall social development. However, due to the pursuit of quantity in the early subway construction, the focus of the design was line planning, which ignored the spatial experience of users, so the spatial guide design of urban subway tended to be homogeneous for a long time. There are three main reasons for the homogenized design of subway in the early stage: first, China has been imprisoned by the concept of "international standardization" for a long time; Secondly, in the large-scale and rapid subway construction in China, due to the outsourcing of design mode, there has been a "homogeneous" application mode, which has brought many negative effects to people in practical application, such as disorientation; Third, the lack of innovative design awareness. In the initial stage of urban development, people's aesthetic concept is mainly "functionalism". Subway construction has experienced unprecedented rapid development, but with the

continuous expansion of urbanization scale, urban civilization construction has become a key problem of social development at the present stage. The author believes that the design of subway public space centering on regional cultural elements plays an important role in the development of global urbanization. Improving the current homogeneous design scheme of subway guide system, extracting regional cultural elements to design station ICONS, cultural walls and interior decoration based on written historical records can not only provide users with convenient and pleasant underground rail space. It can also bring national cultural identity and urban sense of belonging to users who shuttle through the underground space.

2. The Development Status of The World's Subway Space Guidance System

In recent decades, the world economy has changed with each passing day and urbanization has developed rapidly. The level of human development and utilization of underground space has jumped to a new height in the 21st century. The subway is not only a convenient public transportation tool, but also a vertical and horizontal artery under the urban surface, carrying city people to every corner. International research articles, journals and books on subway public space design emerge in an endless stream. Andreas Uebele's subway guide focuses on the design elements of the guide system design, as well as the planning and process of the design project. David Gibson's *Guidebook: Information Design for Public Places* systematically explains the planning and design of design projects from the perspective of guidebook design. The visual beautification of subway guide system design is an important node structure connecting the subway transportation system and the city. Therefore, proper design is needed to attract people, define span, control crowd and safety, and have visibility. As a public space, subway stations bring opportunities for the sustainable development of society. If the urban subway public space design adopts homogeneous design scheme, it will not be conducive to the emotional interaction between users and stations, inconvenient for the continuation of regional culture, and weaken the city's identification in the global integrated development. For example, although the spatial guidance system design of Japanese subway stations provides users with site guidance visually, it lacks attention to users' emotions (see Figure 1 and Figure 2). If Japanese regional cultural elements are added, it can provide users with emotional communication between individuals and the city and make the spatial design of Tokyo subway stations with large population mobility become the name card of Japanese urban culture communication. Therefore, integrating regional cultural elements in harmony with the surrounding environment can not only correctly guide passengers through stations and stairs, but also improve the visual comfort of users' experience of subway stations and establish communication with urban culture.

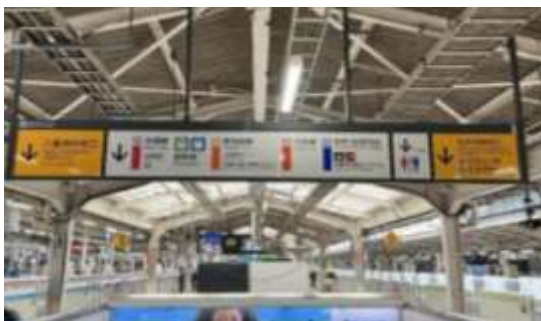


Figure 1: Tokyo Station Line 6 Keihin Tohoku Line
 Photo source : Photographed by author



Figure 2: Inside Tokyo Station
 Photo source : Photographed by author

3. Development Status of China's Subway Space Guidance System

China has a large population density. In the past decade, with the continuous expansion of urban area, many cities have started to build subways, and continuously expand the coverage and extend the length of lines. With the increasing number and utilization rate of subway, the design of comfortable and connotation subway station space has become the primary problem to be solved in the development of civilized society. The early urban subway construction is a homogeneous mode, which widely adopts large-scale and short-term design and construction mode, the most common is the line outsourcing mode, resulting in the phenomenon of "generalization" in engineering application. This means that there is almost no difference in the spatial guide design of the station, resulting in the loss of space sense for users in the underground space, which is easy to cause irritability and depression. For example, Fuzhou, as the political center of Fujian Province, is the starting point of the Maritime Silk Road, and is a famous historical and cultural city in China. However, Fuzhou Metro adopts the homogeneous design mode in the construction (see Figure 3 and Figure 4). For another example, Changsha, Hunan Province, China, is the cultural capital of East Asia and the "media art capital" of the world. But the platform's homogenised design makes it impossible for those who are there to read the story of the city. For another example, the subway space design of Kaifusi Station of Changsha Metro Line 1 cannot show the relationship between above ground and below ground in the surrounding areas and provide users with humanized orientation (see Figure 1-5 and Figure 1-6). It can be seen that the rapid development of economic globalization and subway construction, although the homogeneous design of practicality and normative functionalism has created many miracles, has also led to the lack of urban personality and spirit.



Figure 3: Ninghua Station of Fuzhou Metro Line 2
 Photo source : Photograph by author



Figure 4: Hongwan Station of Fuzhou Metro Line 2
 Photo source : Photograph by author



Figure 5 Juzizhou Station of Changsha Metro Line 2
 Photo source : Photograph by author



Figure 6: Kaifusi Station of Changsha Metro Line 1
 Photo source : Photograph by author

4. Development and Application of Regional Cultural Elements

The establishment of the concept of regional culture is the process of transferring the national concept of modern countries from "the world" to "the nation" [1]. In terms of regional culture, historians of various countries inevitably rely on written historical materials. Integrating regional cultural elements to develop urban subway station space design schemes can establish a dialectical unity between national identity and local identity. Due to the different regional cultures, culture is not only different from country to country, but also different regions of the same country. The design and development of subway space guide system based on regional cultural elements sets culture as a specific proposition, adds the definition of region, and then expresses it in the way of spatial exhibition, bringing users national cultural identity and urban sense of belonging. In recent years, the development focus of Xi 'an Metro has shifted from the early single line planning to the user as the focus, involving the excavation of underground station space and regional culture, and creating the name card of Xi 'an city with the design scheme of one station and one feature.

4.1 Excavation of Regional Culture

Each city has cultural tourism resources that can be developed and used in urban construction. According to the study of written historical materials by historians, Xi 'an was once the capital of 13 dynasties in China's historical development, and it has unique tourism resources. Natural scenery resources include Taiping National Forest Park, the Qinling Mountains and the Qinling Mountains of the national key protection animals golden snub-nosed monkey, giant panda, crested ibis, antelope and so on. Cultural and historical resources cover ancient architecture, folk custom, art, culture and humanistic landscape tourism resources, especially the Daming Palace site park in the Tang Dynasty, the Terracotta warriors and horses in the Qin Dynasty, puppet show, drum music and so on, which are world-renowned intangible cultural heritage. Under the overall planning of the subjective concept of "regionalism", the spatial guide design of Xi 'an Metro station consciously, intentionally, purposefully and creatively realizes the objective concrete image of the conceptual characteristics of each line, the conceptual characteristics of each station and the original function of the public space [2]. Through the valuable regional cultural resources, Xi 'an Metro space guide design system extracts distinctive elements as design symbols, which can not only standardize the traffic information transfer function within the station, beautification of the underground space environment, but also spread a good urban image among people.

4.2 One Station, One Feature

Most of the audience's cognition comes from the above ground environmental information. As subway stations are mostly located underground, it is difficult to obtain positioning information such as direction and markers, so it is impossible to establish a clear "coordinate system" [3]. Xi 'an Metro integrates regional cultural elements, replaces the original subway space homogeneity design scheme, and builds a station space experience with one feature for users. For example, the narrative form of "one line and one scene" of Xi 'an Metro Line 3 comprehensively shows the cultural background of the Silk Road and extends the significance of the culture of the station, breaks through the limitation of the single cultural background of the station, and adopts the expression technique of "one line and one scene". The cultural wall of the Big Wild Wild Pagoda "Buddha Light in Tianzhu" takes the story of Xuanzang's journey west to India as the design concept. Combined with the Big Wild Wild Pagoda, Taj Mahal and other landmark buildings along Xuanzang's western route, combined with the bodhi tree, lotus and other figures with distinct Buddhist cultural imprinting, the long history of cultural establishment and diplomatic relations between China and India are expressed with the graphs

and colors of cultural integration (see Figure 7). It shows the profound Silk Road culture and conveys to the outside world the core position of the ancient city of Xi 'an as the Silk Road and the symbol of the economic belt.



Figure 7: Cultural wall design of Dayan Pagoda subway station of Xi 'an Metro Line 3
Photo source : Photograph by author

4.3 Underground Space Design to Create A City Name Card

With the continuous expansion of modern city scale and the increasing of population, complex subway traffic needs more characteristic urban guidance system to meet the needs of social development. Based on this, this paper analyzes the problems existing in the urban guidance system of complex subway traffic, and puts forward corresponding countermeasures. In 1974, the federal government of the United States commissioned the American Graphic Design Agency (AIGA) to conduct a comprehensive study on traffic signs and other visual communication systems in various countries of the world, and designed 34 kinds of internationally accepted and standardized traffic signs and symbols, and applied them to public transportation places. Visual art critic Clive also pointed out that human emotional experience is often stimulated by visual impression, and the combination of stimulating human emotions is the common feature of visual art. Therefore, standardized and orderly design style has been promoted in the design of urban guide system for a long time.

In recent years, through the investigation of underground space users, it has been found that the homogeneous spatial guide design is not convenient for the development of urban characteristics, so the integration of regional culture is of great significance to the sustainable development of the city. For example, the design of Xi 'an Metro Line 3 station breaks through the limitation of single background of the station, adopts the expression technique of "one line, one scene", takes Xi 'an Silk Road as the cultural background as the design concept, and combines the characteristics of the station to show the cultural wall of "new Silk Road Journey". Among them, the most distinctive Xiaozhai subway station in Yanda District of Xi 'an is connected by twelve relief sculptures (see Figure 8), which reproduces the folk customs of each node country on the Silk Road with the theme of the Silk Road. The patterns in relief, such as the Coliseum in ancient Rome, the God of War in Athens, the Islamic mosque, the flying sky in Dunhuang, and the Terracotta warriors and horses in ancient capital, respectively represent the ancient and brilliant civilization on the Eurasian continent. The first and last two relief sculptures echo the Arab sea ship Black Stone and the Chinese blessing ship of the Ming Dynasty. The cultural wall shows the profound Silk Road culture. The station is a transfer hub in the subway construction planning, and is also an international trade center with a large flow of people. The cultural wall design of Silk Road Splendor makes subway users marvel at the core role of Xi 'an in the long history of the world, and creates a unique city name card of Xi 'an through the regional cultural guidance system of the subway, highlighting the charm of the city. The reform of subway space guide system is the demand of global urbanization

development. Since the beginning of the rise of human urban civilization, urban space guide symbols have begun to appear. The integration of regional cultural elements to serve subway space design not only beautifies the underground transportation environment, plays a positive role in the inheritance of human culture, but also spreads regional culture in large-scale interpersonal circulation. Build a city's name card in global competition.



Figure 8: Silk Road Splendor, Cultural Wall of Xiaozhai Station of Xi 'an Metro Line 3
 Photo source : Photograph by author

5. User Underground Space Experience Based on Regional Culture Design

Graham, an American urban planning scholar, believed that the urban style that human beings rely on for survival is determined by multiple factors, such as unique topography, climate characteristics, living customs, daily activities, decorative styles and so on, which have obvious cultural differences, and people living in different areas are more sensitive to these factors (Andreas, 2009). [4] Subway station is a special semi-closed space. The particularity of underground environment and the weakening of natural environment make people lose the sense of space, which is easy to cause irritability and depression. Gardner argues that intelligent "visuospace" is the ability to form the external world in the human brain and use it to manipulate this model. Its core competitiveness is to accurately perceive the visual world, process and transform perception, and reproduce visual experience in the absence of stimuli [5]. Suppose that the user has memorized the map of the subway station, but when he is actually in the subway station space, he may not know the direction. OTL aichcr, founder of Ulm School of design, said: "To know where to go, you must first understand where you are [6]." Most of the audience's cognition comes from the environmental information on the ground. Since most subway stations are located underground, it is difficult to obtain orientation, signs and other positioning information, and it is impossible to establish a clear "coordinate system"; Especially in complex underground space, it is difficult for users to use ordinary maps as reference to receive new information, which may lead to a lack of sense of direction in unfamiliar environments [7].

Subway stations are located underground, and underground space has different characteristics from aboveground space, which has a particularly significant impact on people's intuitive experience. There are some inherent problems in human activities in underground space, such as disordered biological rhythm, lack of white noise, lack of natural environment, lost direction, high humidity, insufficient frequency of air change, etc., which directly act on body senses and easily cause poor intuitive experience [8], affecting users' daily life. Therefore, how to optimize the relationship between users and underground space in subway construction is an important research proposition in subway construction. In recent years, as architects and artists aim to change the oppression caused by underground space, special design aesthetics, modeling and symbolic techniques of subway space have sprung up one after another. At this point, the

humanized design concept of underground space development has been paid attention to. Xi 'an Urban development extracts regional cultural elements through the historical and cultural record research of the site, so that users can feel the development context of the city, and convey the user-centered design concept in the form of guide system ICONS, cultural walls, interior decoration and so on.

5.1 Regional characteristic icon

Subway station icon is a visual language, which translates spatial information and enables users to understand the spatial location of subway more quickly and effectively [9]. Xi 'an is a city with a long history. The integration of regional cultural elements and the innovation of subway space guidance system design are conducive to improving the confidence of urban culture, and have important guiding significance for Xi 'an city to develop towards internationalization. For example, the ICONS of the whole station of Xi 'an Metro Line 2 are designed with the traditional patterns recorded in historical materials and outline the image through simple lines, which reproduces the urban culture of Xi 'an for users and brings benefits to the sustainable development of the city and the inheritance of human culture (see Figure 9). For example, the graphic design of Yongning Gate station comes from the Ming Dynasty city wall and gate with a history of 100 years as the design prototype; Daming Palace station is marked with the lines and contours of Daming Palace to shape the majesty and solemnity of the palace. The United Nations (1987) defines sustainable development as "development that meets the needs of society" without compromising the ability of future generations to meet their own needs. The icon of the guide system of the whole Xi 'an Metro Line 2 station reproduces the characteristic culture of each station area in Xi 'an, from local cultural identity to national identity.



Figure 9: Station identification system of Xi 'an Metro Line 2
 Photo source : <https://www.sohu.com/>

5.2 Regional Characteristic Cultural Wall

Due to different development processes, economic conditions and ways of life, each region has its own distinctive characteristics in the field of culture and art [9]. The guide system of several subway lines in Xi 'an endows stations with visual creativity and cultural connotation according to the cultural elements of different platforms. For example, the space design of Daming Palace West Station of Xi 'an Metro Line 2. The creative team recreates the Oriental temple "Daming Palace", known as the "Silk Road", by investigating the local ancient and modern historical materials. The cultural wall with the theme of "Guests of All Nations" of the site shows that Xi 'an has been a state of etiquette since ancient times. The picture shows the historical grand occasion of the celebration of all nations in a symmetrical way (see Figure 10), which makes the users who shuttle underground blend with the environment, exude the charm of history, and have respect for the city. The cultural wall of Shijia Street station of Xi 'an Metro Line 4, "Silk Road Paper Making", is designed from the papermaking technology of China's four major

discoveries (see Figure 11) to reappear the key nodes in the development of human civilization. The cultural wall of Datang Lotus Garden site takes the Tang Dynasty garden enjoying the lanterns as the creation theme, draws on the image of ladies in the Painting of Beautiful Women with Hair-Clanching Flowers, depicts the scenery of beautiful women in costumes enjoying the lanterns and enjoying the garden, and shows the festival scenery of Datang Lotus Garden (see Figure 12). The design calls for the necessary cultural return of human society by representing the former cultural scenery. The spatial guidance system of Xi 'an City subway with one station and one feature is supplemented by emotional graphics and color elements, which takes care of users' visual and psychological needs and conveys the humanistic spirit of the city.



Figure 10: Cultural Wall of Daming Palace Station of Xi 'an Metro Line 4



Figure 11: Cultural Wall of Shijia Street Station of Xi 'an Metro Line 3 "Silk Road Papermaking"



Figure 12: Cultural Wall of Datang Furong Garden Station of Xi 'an Metro Line 4
Photo source : Photograph by author

5.3 Interior Decoration with Regional Characteristics

The beauty that needs to be added to the design of guide system is not the same as that of artistic works, and the design of public space needs to meet the needs of people in the most effective way [3]. The subway station is a special semi-closed space. After entering the interior, the weakening of architectural signs and natural environment leads to the lack of space sense and irritability and depression [10]. Due to the high frequency of users raising and lowering their heads in the underground space, the first phase of Xi 'an Metro Line 5 takes "inheritance and integration" as the design theme, and the ceiling is decorated with classical Chinese calligraphy, reflecting the unique subway public space, which not only reflects the long history and culture of Xi 'an, but also takes into account the psychological experience of users (see

Figure 13). After thousands of years of development, Chinese traditional architecture has formed a unique architectural artistic beauty. In addition to the roof, beams and pillars and the platform are also necessary parts of ancient buildings, which not only give the house combination characteristics, but also can develop relatively independently [11]. Yuxiangmen Station of Xi 'an Metro Line 1 uses the auspicious cloud pattern as the granite column decoration pattern, which takes into account the visual experience of users when they look up and reflects the integration of traditional architectural beauty and modern decoration technology (see Figure 14). The upper part of the granite column of Yongningmen station of Metro Line 2 is instored with a red finch, which symbolizes the sacred animal in the south, and symbolizes the south gate of Xi 'an City Wall, showing the regional and cultural characteristics, and intangible expanding the urban image of the station space, so that people can obtain the "cultural corridor of urban memory" [11]. (See Figure 15).



Figure 13: Beikou Station of Yanxiang Road, Line 5 of Xi 'an Metro



Figure 14 Yuxiangmen Station of Xi 'an Metro Line 1 Line 2

Photo source : <http://news.sina.com.cn/>



Figure 15: Yongningmen Station of Xi 'an Railway

Photo source : <http://news.sina.com.cn/>

6. Integrate Regional Culture to Develop The Spatial Landscape of Characteristic Subway Stations

Spatial guidance systems are now mature and will continue to evolve. The public's growing demand for excellent information design also promotes space-oriented design to present a new development trend of diversification, technology, intelligence and environmental protection [12]. In the data integration, the author found that in the world, the overall spatial design of subway stations in Moscow, London and other cities not only satisfies the function of traffic guidance, but also shows rich urban regional characteristics, which has become an important

medium for the dissemination of urban image. With the help of the integration of regional culture research, the guide design of underground space of urban subway will build an artistic space landscape, extract regional cultural elements through the research of historical data of the station, let users feel the development context of the city, set up underground guide view standard, cultural wall, interior decoration, square, water feature, greening, etc., to improve the quality of internal environment. For example, the Moscow subway is recognized as the most gorgeous and beautiful subway in the world, enjoying the name of "underground art palace" (see Figure 16). At the same time, the names of Moscow metro stations are also very distinctive, reflecting the cultural inheritance of the proletarian revolutionary atmosphere of the former Soviet Union. For example: the Communist Youth League, Marx, Revolution Square, trade unions and so on. Of the 195 stations of the Moscow metro, 44 are included in the list of Russian cultural heritage; With a total length of 108 kilometers, each station node in Sweden has a different style of decoration theme. It is called "the longest art museum in the world" and shows the personality of the whole city in terms of the attributes that guide the flow space (see Figure 17).



Figure 16: Russian subway platform
Photo source : <https://www.sohu.com/>



Figure 17: Russian subway platform
Photo source : <https://www.sohu.com/>

7. Conclusion

The integration of regional cultural elements in the application of subway guide space, for the original relatively single subway space station design into the urban culture, taking into account the integration of humanized design and urban personalized development. The author takes Xi 'an city subway construction as the starting point, through the Xi 'an metro station space guide system design case, first of all, shows the importance of regional culture mining in urban personalized development; Secondly, the design style of one station and one feature is used to create a characteristic city name card for Xi 'an. Finally, it is concluded that the concept of regional cultural design will improve the current phenomenon of homogeneous design of subway space, take users as the center, provide users with comfortable visual experience, establish emotional communication with the city, and effectively enhance the global influence of different cities in China.

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