Proceedings of the 4th International Conference on Social Psychology and Humanity Studies
DOI: 10.54254/2753-7048/2026.HZ31879

Marine Culture and Urban Evolution: Cultural Implications in the Naming of Qingdao's Metro System

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Abstract. As a coastal city with diverse cultures and complex linguistic conditions, Qingdao features a distinctive set of metro station names that form an important part of its urban linguistic landscape, which is worthy of in-depth exploration. Taking 172 stations across 8 Qingdao Metro lines as the research object, this paper combines qualitative and quantitative methods to analyze their linguistic characteristics from four dimensions: naming methods, phonetics, character usage and lexical structure. The study finds that Qingdao metro station names are mainly named after streets, supplemented by natural geographical features and residential areas; phonetically, they consist three or four syllables, conforming to common patterns in Chinese expression; high-frequency characters such as "Lu (Road)", "Shan (Mountain)", "Hai (Sea)" and "Dao (Island)" highlight the city's transportation network and coastal hilly landform characteristics; and the lexical structure follows the paradigm "specific name + general name". Based on these findings, this paper points out existing problems in the language use of current metro station names, mainly including unbalanced naming categories within the station name system, syllable redundancy and weakened functions of historical station names, and puts forward corresponding optimization suggestions. This research can provide a useful reference for the construction of Qingdao's urban linguistic landscape, the standardization of language and characters, as well as linguistic studies in similar coastal cities.

Keywords: Linguistic Landscape, Qingdao Metro Station Names, Linguistic Characteristics, Naming Practices, Urban Culture

1. Introduction

Located in the southern part of the Shandong Peninsula, Qingdao borders the Yellow Sea to the east and south, facing South Korea and Japan across the sea, serving as an important port and foreign trade gateway for China, connecting with more than 700 ports worldwide. Qingdao was officially established as an administrative region in 1891 and was later occupied by Germany and Japan for about 32 years; it was not liberated until Japan's surrender in 1945. Its distinctive historical evolution and geographical location have shaped Qingdao's diverse cultures and complex linguistic conditions. With profound local dialects and a strong foundation of Chinese culture, coupled with the influence of foreign cultures, the details of its language use pattern and in-depth evolution still require more sociolinguistic research.

DOI: 10.54254/2753-7048/2026.HZ31879

2. Literature review

In November 2013, the Third Plenary Session of the 18th Central Committee of the Communist Party of China adopted the "Decision of the Central Committee of the Communist Party of China on Several Major Issues Concerning Comprehensively Deepening the Reform", proposing to take "promoting the modernization of the national governance system and governance capacity" as the overall goal of comprehensively deepening the reform. As an integral part of national governance, the significance of language governance has become increasingly prominent, with linguistic landscape being a key aspect of it [1].

In 1997, Landry and Bourhis proposed the concept of the "linguistic landscape", which has gradually become an important research perspective in sociolinguistics [2]. By analyzing various linguistic elements in urban areas, including both official and private signs, researchers can roughly assess the city's linguistic power, identity and ideology, thereby reflecting the overall sociolinguistic ecology.At present, numerous cities around the world have conducted relevant empirical research, including Lisbon [3], Singapore [4] and Athens [5].

"Optimizing the ability of language services to contribute to social development" is one of the goals of language governance [6]. As an important aspect of language governance, linguistic landscape has attracted widespread attention from Chinese researchers and language policymakers [7]. Nationwide, many cities have been surveyed, such as Beijing [8], Shanghai [9], Macao [10]and Hong Kong [11]. As an important coastal tourist city and foreign trade hub in China, Qingdao's linguistic conditions have also been studied from multiple perspectives: Zhang Yan focused on Qingdao marine cultural tourism landscape, revealing the development of marine cultural tourism and related policy orientations behind the marine cultural linguistic landscape [12]; Miao Xing explored the linguistic landscape of Qingdao from the cross-cultural perspective of international students in Qingdao and put forward relevant improvement suggestions [13]; Fan Jie and Fan Haiyun focused on the translated texts on signs and proposed suggestions for international language construction and urban development [14].

At the same time, in recent years, relying on its characteristics of high efficiency, large capacity and low pollution, the metro has been deeply integrated into China's urbanization process, becoming a core infrastructure supporting the operation of urban public transportation networks and ensuring people's daily travel. With its distinct public attributes and strong social influence, the metro has become a key research object in multiple fields such as transportation engineering, urban management and social culture. Among them, the metro linguistic landscape—centered on station names, directional signs, and public slogans—not only fulfills the practical functions of guiding passenger flow and conveying information but also embodies the city's regional historical and cultural memories [15,16] as well as public service concepts. It constructs the city's brand image [17] and serves as a key entry point for academic circles to analyze urban cultural connotations and optimize public space experiences.

Based on the literature retrieval results from CNKI, a statistical analysis using "metro station names" as the core keyword shows that the metro station name systems of about 30 cities in China have been included in the sociolinguistic research framework. Among them, Beijing, Shanghai, Guangzhou, etc., have become core research objects with high attention and rich achievements due to their strong representativeness in urban development. As an important node city on the northern coast of China, Qingdao metro station naming logic aligns with the symbolic construction function of public signs. It undertakes the dual demands of identity shaping and cultural expression [18], embodies both marine cultural genes and the context of modern urban development, and presents a unique linguistic landscape feature distinct from the aforementioned cities. However, existing

DOI: 10.54254/2753-7048/2026.HZ31879

research on it is relatively limited—by October 2025, only two relevant papers have been published in this field [19,20]. These studies not only have the problem of insufficient coverage of research objects but also lack comprehensiveness in research perspectives, leaving considerable room for deepening.

Based on the above discussion, this paper takes this as the entry point, adopts qualitative and quantitative analysis methods, attempts to reflect the language use of Qingdao metro station names, and provides references for the standardization of language and characters in Qingdao.

3. Linguistic use characteristics of Qingdao metro station names

The construction of Qingdao Metro started partially in 1994 but was suspended due to policy adjustments and restarted in 2009. Among them, Line 3 is Qingdao's first operational metro line, fully opening publicly in December 2016. According to the information released on Qingdao government website, by the end of 2024, Qingdao Metro has 8 operational lines, namely Line 1, Line 2, Line 3, Line 4, Line 6, Line 8, Blue Valley Express Line and West Coast Express Line, with an operational mileage of 352 kilometers and 172 stations (transfer stations are not counted repeatedly), as shown in the picture below.

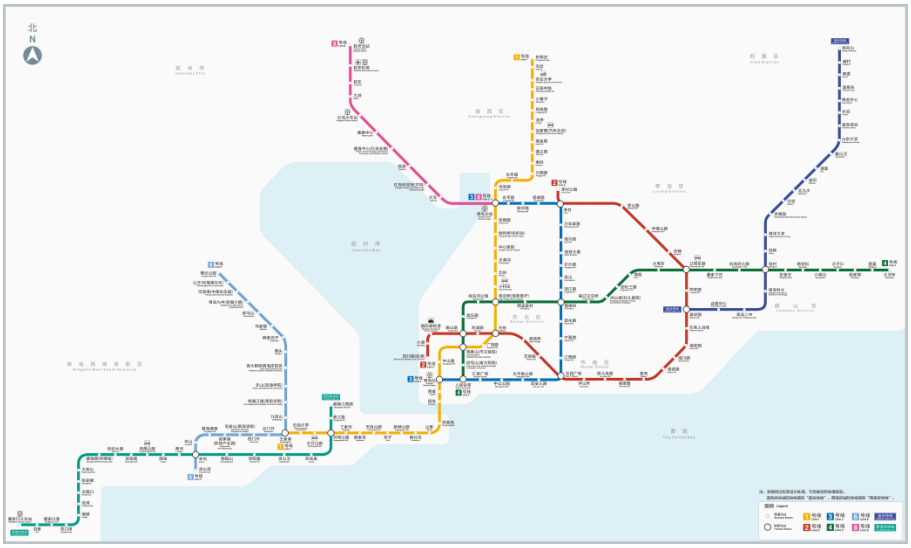

Figure 1. Qingdao metro operational route map

In accordance with the "Qingdao Place Name Administration Regulations", "Place Name Administration Regulations", and the rationale for naming Qingdao Metro stations, this paper summarizes, counts and analyzes the names of 172 metro stations (transfer stations are counted only once and the content in parentheses after each station name is excluded) across the eight lines of Qingdao Metro.

3.1. Naming methods of Qingdao metro station names

3.1.1. Statistical analysis of naming methods

Metro stations are named based on various rationales, carrying important information such as a city's historical culture and changes in urban development [21]. To fully investigate the naming methods of Qingdao's metro station names, this paper initially draws on previous studies to classify them into

DOI: 10.54254/2753-7048/2026.HZ31879

6 main categories: names of streets, roads and bridges; names of municipal facilities; names of natural geographical features; names of residential areas; names of educational institutions; and names of historical coastal defense areas. A total of 172 metro station names analyzed in this paper are classified and counted one by one, and the results are shown in the table.

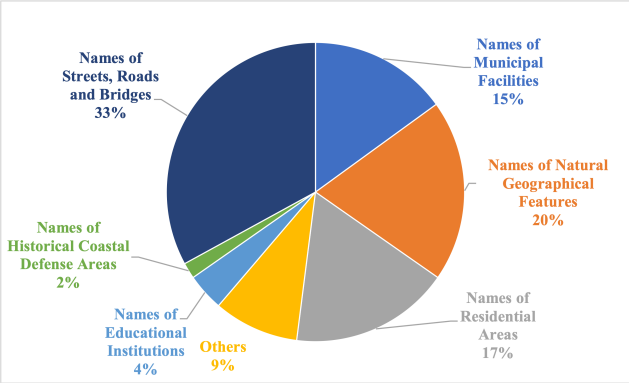

Figure 2. Pie chart of proportion of naming methods of Qingdao metro stations

As shown in the figure 2 above, among Qingdao metro station names, those named after "streets, roads and bridges" account for the highest proportion, reaching 33%; the proportions of "names of natural geographical features", "names of residential areas" and "names of municipal facilities" are 20%, 17% and 15% respectively; the proportions of "names of educational institutions" and "names of historical coastal defense areas" are relatively low, 4% and 2% respectively; in addition, 9% of the samples belong to the "others" category. It can be seen that the naming of Qingdao metro stations largely relies on urban spatial elements such as the existing urban street system and natural geographical resources, with strong spatial directivity and regional relevance.

3.1.2. Statistical analysis of naming methods

Combined with the statistical results of Qingdao metro station naming methods and urban characteristics, the following will analyze the categories with the highest proportions, including categories of streets, roads and bridges, natural geographical features, residential areas, as well as the ancient regional category that can highlight the historicity and locality of urban naming, presenting the urban spatial structure, natural landscape and population distribution characteristics.

According to statistical results, about 30% of Qingdao metro stations are named after streets, roads and bridges for several reasons.

Firstly, this naming method is consistent with the urban road naming system, enabling citizens and tourists to quickly locate the metro station based on familiar road names. For example, "Zhongshan Road" metro station is named after Zhongshan Road, which has a long history and high recognition among citizens and tourists. Naming the metro station after it can greatly improve its recognition.

At the same time, the names of streets, roads and bridges are important veins of urban development. Such naming helps reflect the traffic radiation range and functional positioning around the station. For example, "Yanan Third Road", which passes through multiple commercial and residential areas, is named after the road, allowing passengers to intuitively know the distribution of vibrant areas around the station.

Naming metro stations after streets, roads and bridges is also an inheritance of urban historical culture. Some roads in Qingdao have a long history, such as Guangrao Road, which has become part

DOI: 10.54254/2753-7048/2026.HZ31879

of urban memory, reflecting the urban style and development trajectory of specific historical periods.

In addition, bus station names are mostly based on road names [22]. Metro stations adopting the same naming method are conducive to citizens transferring between different means of transportation and improving travel efficiency. For example, "Haipoqiao" station, whether reached by bus or metro, is named after the bridge, making transfers more convenient and facilitating citizens to plan travel routes.

About 20% of Qingdao metro station names are named after natural geographical features, which are closely related to Qingdao's unique natural geographical environment.

The terrain of Qingdao is dominated by hills, with numerous mountain ranges such as Laoshan Mountain Range, Daze Mountain and Jiaonan Mountain Group widely distributed. Metro station names such as "Xinhaoshan (Signal Mountain)", "Shuangshan (Double Mountain)" and "Dazhushan (Big Pearl Mountain)" are directly named after the surrounding mountains. These mountains are not only natural landmarks of the city but also important references for people to identify geographical locations.

At the same time, as a coastal city, Qingdao has a vast sea area, with a total coastline of 882.92 kilometers and numerous bays, islands and rivers. Station names such as "Dingjiahe (Dingjia River)", "Lingshanwan (Lingshan Bay)" and "Jimiya (Jimi Cliff)" are "locally sourced", reflecting Qingdao's rich hydrological and geographical characteristics and helping tourists and residents understand the marine-related functional areas around the station.

This way of naming not only facilitates people's travel, but also carries the city's natural characteristics, which is an intuitive reflection of Qingdao's mountain and sea landscape in the urban transportation naming system. Citizens and tourists can feel the unique geographical charm of this city when taking the metro.

Nearly 20% of Qingdao metro stations are named after residential areas. This is closely related to the urban development context, residents' living needs and regional culture.

From a historical perspective, most of these residential area names carry the memory of Qingdao urban-rural evolution. For example, "Licun" and "Xizhen (West Town)" have been important settlements in Qingdao since the last century. Retaining them as metro station names can arouse citizens' emotional connection with regional history.

From a practical functional perspective, naming metro stations after residential areas can also accurately serve commuting needs. Urban areas in Qingdao are often closely connected with surrounding streets and towns. For example, residential areas such as "Liuting" and "Boli" are densely populated residential areas or transportation hubs. Naming metro stations directly after them allows residents, especially groups such as the elderly and migrant workers, to quickly identify the locations.

In addition, such place names also reflect the characteristics of Qingdao's regional culture. Suffixes such as "Bu" and "Zhaike" are common in village names on the Jiaodong Peninsula, such as "Dabudong (East of Big Bu)" and "Nanzhaihe (South Zhaike)", which not only retain dialect cultural marks but also distinguish Qingdao metro naming from other cities', making it more locally identifiable.

Three of Qingdao metro station names are named after historical coastal defense areas.

"Fushansuo (Fushan Station)" was established in the early Ming Dynasty, named after its proximity to Fushan, guarding a strategic location; "Aoshanwei (Aoshan Guard)" was built in the 31st year of the Hongwu reign [23], forming an "east-west corner" with Lingshanwei in Jiaozhou Bay; "Lingshanwei (Lingshan Guard)" was established in the 5th year of the Hongwu reign, and

DOI: 10.54254/2753-7048/2026.HZ31879

together with Tianjinwei, Weihaiwei and Andongwei, it is known as the "Four Great Guards in the North". It once repelled Japanese pirates and escorted grain transportation.

Though there are only three samples in this category, they have witnessed Qingdao's anti-enemy history and carried urban memory, so they are not included in the "others" category. They silently inherit that period of history and become a cultural link connecting the past and the present.

3.2. Linguistic use analysis of Qingdao metro station names

3.2.1. Phonetic analysis

Phonetics is a core carrier of both "practicality" and "culture" in linguistic landscapes. It not only directly affects the public's recognition efficiency, memory depth, and usability of metro station names but also hides the in-depth veins of urban historical culture and language traditions. As a coastal city in the northern dialect area, Qingdao presents the characteristic of "taking Mandarin norms as the foundation and regional culture as the core" in the phonetic system of its metro station names—it not only strictly follows the "Basic Rules for the Chinese Pinyin Orthography" to ensure the universality and standardization of public signs but also integrates the city's unique historical memory and geographical characteristics into syllable combinations and rhythmic patterns, forming a phonetic ecology of "coexistence of standardized expression and cultural transmission".

After deduplication, among the 172 Qingdao metro station names in the eight lines, there are 37 two-syllable names, 82 three-syllable names, 42 four-syllable names, 9 five-syllable names, 1 six-syllable name and 1 nine-syllable name. From the data, it can be seen that the naming of Qingdao metro stations is mainly composed of three and four syllables, accounting for 47.67% and 24.42% of the total samples respectively, as shown in Table 1 below.

From a functional perspective, three and four-syllable station names can fully express information such as the region and function related to the station when passengers receive and memorize information, without increasing memory difficulty and the complexity of information transmission due to excessively long syllables, helping passengers travel efficiently.

From an economic perspective, three and four-syllable station names can achieve high efficiency and low cost in all links. During voice announcements, the rhythm is moderate and easy to distinguish; in sign production, the number of characters is moderate, facilitating typesetting and visual presentation; in the process of text dissemination, it is also easier to display concisely and clearly on various media such as maps and APPs, saving communication resources.

In summary, the syllable length of Qingdao metro station names well adapts to the requirements of the construction and operation of the urban metro transportation sign system, providing strong support for citizens' convenient travel and the dissemination of urban transportation information.

The rhythmic patterns of Qingdao metro station names are rich and regular. Names of different syllable lengths have their own unique rhythmic combination methods. These combinations not only conform to Chinese expression habits but also play a key role in practical applications.

For three-syllable station names, the "2+1" combination accounts for an extremely high proportion, such as "Wangjiagang (Wangjia Port)". Such station names are catchy, in line with language perception, and convenient for passengers to remember and identify. Another "1+2" combination, such as "Xiaocunzhuang (Small Village)", is relatively small in number but brings changes to the rhythm of three-syllable station names, making the overall more hierarchical.

Four-syllable station names mainly have two rhythmic combination forms: "2+2" and "3+1", with relatively close proportions. The "2+2" form, such as "Shandong Daxue (Shandong University)", has a stable and symmetrical rhythm, giving people a regular feeling; the "3+1" combination, such as

DOI: 10.54254/2753-7048/2026.HZ31879

"Taihangshan Road", has undulating rhythm changes, highlighting key points while maintaining a sense of rhythm.

The rhythmic patterns of five-syllable station names are more diverse than the above two categories. Combination forms such as "2+2+1", "3+2" and "2+3" all appear, such as "Guoji Youlungang (International Cruise Port)", "Taipingjiao Gongyuan (Taipingjiao Park)" and "Fuliao Lijiaoqiao (Fuliao Overpass)", with relatively balanced proportions of each form. It can be seen that five-syllable station names are more likely to meet different naming needs and endow station names with more diverse rhythms. In addition, the six-syllable "Dongjiakou Huochezhan (Dongjiakou Railway Station)" adopts the "3+2+1" rhythmic pattern, and the nine-syllable "Qingda Fuyuan Xihai'an Yuanqu (Qingdao University Affiliated Hospital West Coast Campus)" adopts the "2+2+3+2" rhythmic pattern. Due to the limited number of samples in these two categories, it is difficult to form universal analysis conclusions, so further discussion on their rhythmic patterns is not conducted.

The rhythmic patterns of Qingdao metro station names play a significant role in improving the readability of station names and enhancing passengers' memory effects. Their rhythmic patterns not only make it easier for passengers to remember station names when taking the metro but also reflect Qingdao's unique linguistic and cultural charm, adding cultural connotations to the urban transportation sign system.

Table 1. Statistical table of rhythmic patterns of Qingdao metro station names

Number of Syllables	Rhythmic Pattern	Quantity (pieces)	Percentage (%)	Example
Three-syllable	2+1	76	92.68%	王家港 (Wangjia Port)
	1+2	6	7.32%	小村庄 (Small Village)
Four-syllable	2+2	22	52.38%	山东大学 (Shandong University)
	3+1	20	47.62%	太行山路 (Taihangshan Road)
Five-syllable	2+2+1	4	44.44%	国际邮轮港 (International Cruise Port)
	3+2	4	44.44%	太平角公园 (Taipingjiao Park)
	2+3	1	11.11%	福辽立交桥 (Fuliao Overpass)
Six-syllable	3+2+1	1	100.00%	董家口火车站 (Dongjiakou Railway Station)
Nine-syllable	2+2+3+2	1	100.00%	青大附院西海岸院区 (Qingdao University Affiliated Hospital West Coast Campus)

3.2.2. Phonetic analysis

Characters and words are the basic constituent units of metro station names. As an important observation point of urban linguistic conditions from a sociolinguistic perspective, character and word frequency analysis can reflect the dominant position of Mandarin in public signs, and also imply the influence of regional dialects and cultures on language choices, providing micro-level empirical evidence for a comprehensive interpretation of Qingdao's sociolinguistic conditions.

According to statistics, 254 characters are used in the names of 172 Qingdao metro stations. Because of the small sample size, only the top 27 characters by frequency are statistically analyzed and sorted out below. The following table is the statistical table of character frequency in Qingdao metro station names.

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Table 2. Statistical table of character frequency in Qingdao metro station names

Serial Number	Character	Frequency	Serial Number	Character	Frequency	Serial Number	Character	Frequency
1	路 (Road)	53	10	学 (School)	8	19	站 (Station)	6
2	山 (Mountain)	53	11	北 (North)	8	20	医 (Medical)	6
3	家 (Home)	16	12	青 (Blue/Green)	8	21	泊 (Anchorage)	6
4	海 (Sea)	16	13	港 (Port)	7	22	埠 (Mound)	6
5	大 (Big)	14	14	西 (West)	7	23	桥 (Bridge)	5
6	岛 (Island)	13	15	村(Village)	7	24	小 (Small)	5
7	中 (Middle)	11	16	园 (Park)	7	25	江 (River)	5
8	院 (Institute)	11	17	河 (River)	6	26	口 (Mouth)	5
9	东 (East)	11	18	安 (Peace)	6	27	心 (Center)	5

When combined with this table, the composition characteristics of Qingdao metro station names can be further interpreted from the categories and connotations of high-frequency characters, with specific analysis as follows.

Firstly, some high-frequency characters in the table effectively reflect Qingdao's core attributes.

In the table, the characters "Lu (Road)" and "Shan (Mountain)" tie for first place with a high frequency of 53, becoming the core Chinese characters in station names. Among them, the character "Lu (Road)" is widely used in station names of the street, road and bridge category such as "Yanan Third Road" and "Taihangshan Road", confirming Qingdao's mainstream way of naming metro stations after road names and reflecting the in-depth influence of the urban transportation network on the station name system; "Shan (Mountain)" corresponds to station names of the natural geographical feature category such as "Xinhaoshan (Signal Mountain)" and "Shuangshan (Double Mountain)", closely linked to Qingdao's natural characteristic of "hilly landform" and making station names naturally carry urban natural landscape memory points.

In addition, the high-frequency use of the characters "Hai (Sea)" and "Dao (Island)" directly echoes Qingdao's positioning as a "coastal port city"—"Hai (Sea)" is found in station names such as "Haipoqiao (Haipo Bridge)" and "Huanghai Road (Yellow Sea Road)", and "Dao (Island)" corresponds to island-related stations such as "Huangdao Station (Yellow Island Station)" and "Xuejiadao (Xuejia Island)". Both strengthen Qingdao's close connection with the ocean and are an intuitive projection of the city's marine culture at the linguistic level.

Secondly, some high-frequency characters reflect functional and living attributes.

Characters related to residence and people's livelihood such as "Jia (Home)", "Cun (Village)" and "Bu (Mound)" meet practical needs and are mostly used in station names of the residential area category such as "Wangjiagang (Wangjia Port)", "Xiaocunzhuang (Small Village)" and "Dabudong (East of Big Bu)". These Chinese characters originate from the names of traditional settlements in Qingdao, which are in line with the daily life context of citizens and can accurately serve commuting needs; "Yi (Medical)", "Yuan (Institute)", and "Xue (School)" point to public service facilities such as medical care and education, allowing station names to directly convey functional attributes and improve travel efficiency.

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Characters such as "Dong (East)" and "Xi (West)" are used as directional words, often serving as modifiers in station names to enhance spatial directivity, such as "Donglicun (East Licun)" and "Xizhen (West Town)". By clarifying spatial orientation and volume, directional words can help passengers distinguish similar stations and reduce confusion.

It should be particularly noted that although this study has conducted systematic character frequency statistics on station names, it has not carried out in-depth word frequency statistics. The core reason is that the effectiveness of word frequency statistics is highly dependent on the quantity and structural diversity of samples, and the sample characteristics of Qingdao's metro station names make their word frequency statistics lack sufficient reference significance—when extracting "words" separately for statistics, most of them appear only once, making it difficult to form a regular distribution.

3.2.3. Lexical structure analysis

The composition of place names usually includes two core elements: specific names and general names. General names, like the "genus" in the genus-differentia definition method, assume the classification function, incorporating specific places into corresponding categories to form a systematic naming logic; specific names correspond to "differentia", focusing on the uniqueness of places to distinguish different individuals in the same category, lacking systematic characteristics. It can be seen that the scientificity of the place name naming system essentially depends on the general names [24]. Based on this, this section will analyze the structural characteristics of Qingdao's metro station names from two aspects: classification of general name usage and lexical composition forms, explore the functional attributes and cultural connotations behind them, and provide structural-level empirical support for interpreting Qingdao's sociolinguistic conditions.

As an important part of Qingdao's metro station names, general names not only reflect the attributes and functions of the stations, but also reflect the city's geographical and humanistic characteristics. Based on the statistical data above, general names can be classified into two levels, as shown in the following table.

Table 3. Classification of general names in Qingdao metro station names

First-level Classification	Second-level Classification	Specific Words
General Names of Human Geographic Entity Place Names	Transportation Facility Category	Lu (Road), Qiao (Bridge), etc.
	Public Service Category	Yiyuan (Hospital), Gongyuan (Park), Daxue (University), etc.
	Residential Settlement Category	Cun (Village), Tun (Village), etc.
	Historical Coastal Defense Area Category	Wei (Guard), Suo (Station), etc.
General Names of Natural Geographic Entity Place Names	Terrain Type Category	Shan (Mountain), Ling (Ridge), etc.
	Water Area Type Category	Dao (Island), He (River), Wan (Bay), etc.

The classification of general names of human geographic entities is similar to the character frequency statistical results above. Transportation facility category words such as "Lu (Road)", "Qiao (Bridge)", and "Gang (Port)" have the highest frequency of use, which is deeply consistent with the mainstream way of naming metro stations after streets, roads and bridges; general names of the public service category such as "Yiyuan (Hospital)" and "Daxue (University)" are accurately associated with medical care and educational institutions, directly conveying station functional attributes and reducing the information retrieval cost of passengers' travel; general names of the residential settlement category such as "Cun (Village)" and "Tun (Village)", mostly originate from

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traditional village names, retaining the cultural marks of settlements on the Jiaodong Peninsula; general names of the historical coastal defense area category such as "Wei (Guard)" and "Suo (Station)", although small in number, are unique general names and linguistic relics of Qingdao's coastal defense history in the Ming and Qing dynasties, endowing station names with the significance of "living historical markers".

General names of natural geographic entities are closely linked to Qingdao's natural endowments. "Shan (Mountain)" , in the terrain type category, echoes the city's hilly landform; "Dao (Island)", "He (River)" and "Wan (Bay)" in the water area type category are directly related to Qingdao's characteristic of a "coastal port city", making station names an intuitive carrier of the marine characteristics.

Based on the statistics of 172 station names, the lexical composition forms can be mainly divided into four categories.

Firstly, the "full specific name" form. Such station names have no clear general names and are only composed of specific names, mostly historical place names or unique settlement names, relying on the public's cognition of local place names, such as "Anzi", "Gaoyu" and "Liuting".

Secondly, the "specific name + general name" form. This form is the mainstream composition form, consisting of one specific name plus one general name, which can clearly convey the station's attributes and location. It can be further subdivided into various types such as "directional specific name + general name", "characteristic specific name + general name" and "functional specific name + general name". Among them, the "directional specific name + general name" category is characterized by specific names containing directional words such as "Dong (East)" and "Xi (West)", such as "Beizhai (North Zhai)" ; the "characteristic specific name + general name" category is characterized by specific names reflecting geographical, morphological and other characteristics, such as "Shuangshan (Double Mountain)"; the "functional specific name + general name" category is characterized by specific names highlighting the functional attributes associated with the station, such as "Jianshen Zhongxin (Fitness Center)" and "Bolan Zhongxin (Exhibition Center)".

Thirdly, the "specific name + specific name + general name" form. Such station names are composed of two specific names combined with one general name. The first two specific names are mostly combinations of direction and region, sequence and region, which not only refine the specific direction of the station but also clarify the attributes through the general name, such as "Jinsong Third Road". In this name, "Jinsong" is the regional specific name, "San (Third)" is the sequence specific name, and "Lu (Road)" is the general name.

Fourthly, the "specific name + general name + general name" form. Such station names contain double general names, defining the station's attributes from different dimensions. The first general name mostly points to the region or settlement, and the second general name points to the function or geographical feature, making the station's attributes clearer, such as "Licun Gongyuan (Licun Park)". In this name, "Licun" is the regional specific name, "Cun (Village)" is the settlement general name, and "Gongyuan (Park)" is the functional general name.

Combined with the above content, the linguistic use characteristics of Qingdao metro station names can be summarized as follows: (1) The naming method is closely linked to urban space and culture, mainly relying on urban elements such as streets, roads, bridges and residential areas, integrating natural geographical characteristics and landmarks such as universities and transportation hubs, and becoming a carrier of urban culture and social psychology; (2) The syllables are mainly two or four syllables, in line with the public's memory rules, and most station names have alternating level and oblique tones, with harmonious rhythm and catchy pronunciation, both auditory beauty and memory convenience; (3) The naming structure follows the "specific name +

DOI: 10.54254/2753-7048/2026.HZ31879

general name" paradigm, and the specific names are mostly in the form of phrases, in line with linguistic structure and usage habits.

4. Existing problems and standardization of language use in Qingdao metro station names

Through analyzing the linguistic characteristics of Qingdao metro station names, and integrating the practical requirements of public transportation signage with the function of urban cultural communication, we can identify room for optimization in three aspects: the balance of naming logic, the efficiency of syllabic rhythm, and the cultural functional exertion of historical place names. The following sorts out specific problems and puts forward standardization suggestions.

4.1. Relative imbalance in naming methods and insufficient cultural coverage

From the statistical results of the naming method categories of Qingdao metro station names, the proportion of streets, roads and bridges is as high as 32.95%, and the proportions of natural geographical features and residential areas are about 20% each. In contrast, the proportions of other categories are relatively small, showing an unbalanced distribution. Admittedly, relying on streets, roads and bridges for naming can improve the convenience of positioning, but it also weakens their ability to carry the diverse cultures. Taking Qingdao's industrial culture as an example: as one of the birthplaces of modern industry in China, Qingdao has unique industrial memories such as beer culture and textile culture, but they have not been effectively reflected in station names. Qingdao Beer Museum, as a cultural landmark of the city, is a core window to show Qingdao's industrial history and urban characteristics. However, the two nearest metro stations to the museum, "Lijin Road Station" and "Guangrao Road Station", are directly named after road names without incorporating any elements related to beer culture, making it difficult to highlight the core cultural resources and characteristics around them.

When constructing an urban linguistic landscape, shaping the cultural charm of a city should also be an important consideration [25]. Control the proportion of station names of the street, road and bridge category between 25% and 30%, and fully combine their corresponding cultural characteristics according to their location to name them from the perspectives of education, history and industry. For example, for science and technology and education, additional stations such as "Qingdao University East Station" or "Ocean University of China Laoshan Campus Station" can be set up to increase the coverage of station names of the educational institution category; for the unique industrial culture, stations such as "Beer Museum Station" and "Guomian No.6 Factory Station" can be set up around landmarks such as Qingdao Beer Museum and Qingdao No.6 National Cotton Factory to enrich the presentation of industrial culture in the linguistic landscape.

4.2. Local syllable redundancy and uneven information transmission effect

Although Qingdao metro station names are mainly composed of three and four syllables (accounting for 72.09% in total), which is aligns with the economic principle of information transmission, there are still syllable redundancy problems. Among them, the six-syllable "Dongjiakou Huochezhan (Dongjiakou Railway Station)" and the nine-syllable "Qingda Fuyuan Xihai'an Yuanqu (Qingdao University Affiliated Hospital West Coast Campus)" may cause inconvenience in daily communication and written recognition. In addition, although five-syllable station names have diverse rhythmic combinations, the proportions of the three rhythmic patterns of "2+2+1", "3+2" and "2+3" are relatively scattered, lacking a unified rhythmic rule. Some station names such as

DOI: 10.54254/2753-7048/2026.HZ31879

"Fuliao Lijiaoqiao (Fuliao Overpass)" (2+3 type) are more difficult to remember quickly than "Taipingjiao Gongyuan (Taipingjiao Park)" (3+2 type), resulting in significant differences in the information transmission efficiency of station names with different syllables.

In summary, it is necessary to formulate clear standards for syllable length. Combined with the existing distribution of station name lengths, the practical needs of public signs, and referring to the actual situation that metro systems in first-tier cities such as Beijing, Nanjing and Shenzhen have very few station names with six or more syllables, it is recommended that new metro station names should preferably have 2 to 5 syllables, reducing the use of station names with six or more syllables to reduce information transmission redundancy from the source. Among them, if conditions permit, three or four-syllable combinations are highly recommended. This syllable length can not only fully carry the regional or functional information of the station but also ensure that the rhythm is moderate and easy to distinguish during voice announcements. At the same time, in the typesetting of signs and the display on various travel platforms, it can also achieve a concise and clear visual effect, further improving the efficiency of information transmission.

To address the problem of scattered rhythmic combinations of five-syllable station names, existing station names can be fine-tuned, and it is recommended to take the "3+2" type as the main combination form. The advantage of this rhythmic structure is that the first 3 syllables can focus on highlighting the core regional characteristics or functional attributes of the station, such as "Taipingjiao", allowing passengers to quickly capture key information; the latter 2 syllables clarify the station category, such as "Gongyuan (Park)", forming a clear logic of "core information + category positioning", which is not only in line with the Chinese expression habit of "emphasizing the core and downplaying modifiers" but also can enhance memory points through regular rhythmic layering. For example, when adopting five-syllable station names in the future, names with the "3+2" structure, like "Shilaoren Yuchang (Shilaoren Beach)", can be considered. The former highlights the regional landmark with "Shilaoren" and clarifies the functional category with "Yuchang (Beach)". Through a unified rhythmic system, five-syllable station names can be more easily remembered, and a stable and efficient voice recognition effect can be gradually formed.

4.3. Weakened function of historical station names

Identification and indexing are the basic capabilities that metro station names should possess [26]. With the continuous advancement of Qingdao's urban development process, many geographical areas originally pointed to by old place names (such as ancient docks, traditional villages, etc.) have gradually disappeared, and their spatial carriers have been mostly replaced by modern residential areas, commercial complexes, public service facilities, etc. Reflected in the metro naming system, historical place name stations containing urban cultural context such as "Cuobuling" and "Fushansuo", although retaining historical elements such as "Bu" and "Suo", form cognitive barriers for non-local groups such as new citizens and tourists—they have been separated from the contemporary context, unable to transmit practical travel information, and it is difficult for people to directly perceive the historical connotations behind the place names. Eventually, historical place names become "unfamiliar symbols", weakening the spatial directivity of the station names and making cultural inheritance superficial.

To solve the aforementioned dilemma, the following solutions are proposed: construct a "basic station name + double supplement" system for such stations. At the physical level, add simplified information signs on platform walls and entrances/exits, marking the historical origin and modern development of the metro station names simultaneously (such as "there is a hospital nearby"); at the digital network level, add short graphic and text " stories behind the place name" on the station

DOI: 10.54254/2753-7048/2026.HZ31879

detail pages of metro APPs and navigation software, and supplement brief prompts in train announcements (such as "Next station, Fushansuo, once a coastal defense fortress in the Ming Dynasty, get off to reach Fushan Business District"). This not only retains the core of historical place names but also allows them to take into account travel guidance and cultural transmission functions.

In summary, the optimization of language use in Qingdao metro station names needs to balance "functional practicality" and "cultural inheritance". By balancing naming categories, standardizing syllable rhythms and activating the value of historical place names, it can not only improve the efficiency of public transportation information transmission but also make station names better carry urban cultural connotations, helping the construction of urban linguistic landscape.

5. Conclusion

Through qualitative and quantitative analysis, this paper systematically sorts out the linguistic characteristics of Qingdao metro station names in terms of naming methods, phonetics, character usage and lexical structure, reveals their characteristics of both spatial directivity and regional culture, and points out existing problems such as unbalanced naming and syllable redundancy as well as optimization paths. In the future, the construction of relevant public signs and other linguistic landscapes in Qingdao can continue the naming logic of "coexistence of function and culture", and help upgrade the urban linguistic landscape through station name optimization. On the one hand, combine the expansion of new lines to integrate cultural elements such as industry and folk customs into naming, enriching the cultural dimension of the linguistic landscape; on the other hand, rely on digital technology to deepen the "story-based" communication of historical place names and strengthen the cultural inheritance function.

In addition, the analysis framework and conclusions of this study can also provide references for the planning of metro station names in other coastal cities with both natural characteristics and historical heritage, promoting the development of urban public transportation linguistic landscapes in a more standardized, cultural, and identifiable direction.

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