

A Morphological Typology-Based Study of the Spatial Characteristics of Streets in the Suzhou Zicheng District

Zhang Ziyan^{1,a,*}

¹*Gold Mantis School of Architecture, Soochow University, Suzhou, Jiangsu, China*

^a945971126@qq.com

*Corresponding author

Abstract: Under the process of urbanization, the form of the street space in historical and cultural blocks has been damaged to a certain extent. However, the form characteristics of the street space in historical blocks not only affect people's travel safety and health, but also influence people's perception of the city's image and their understanding of culture. From the perspective of morphological typology, this article takes the street space in the Zicheng district of Suzhou as the research object, analyzes the spatial characteristics and existing problems of different types of streets in the Zicheng district, and then puts forward targeted optimization suggestions. The aim is to provide a reference for the protection and renewal development of the street spatial form in the Zicheng district of Suzhou, promote the development of the slow-moving streets in the Zicheng district, and enhance the vitality of the streets.

Keywords: The morphological typology; Street space; Spatial characteristic; Suzhou Zicheng district

1. Introduction

The Zicheng District of Suzhou is a complex historical district in the ancient city of Suzhou. It combines the architectural style of the Republic of China era with the material and cultural attributes of red culture inheritance. Its street space not only serves the basic functions of residents' daily travel, safety and health, and social interaction, but also meets the spiritual needs of tourists for cultural experience and exploration. However, influenced by urban development, the Zicheng district has undergone multiple damages and reconstructions. The construction activities in different periods have led to a diverse and mixed street form, and the historical texture and spatial characteristics of the streets have been affected to a certain extent. Therefore, this article analyzes the street spatial characteristics of the Zicheng district from the perspective of morphological typology. It provides a certain reference basis for the subsequent research on the street space in the Zicheng district.

2. Basic concepts

2.1 Morphological typology

Morphological typology is actually a research paradigm that integrates urban morphology and architectural typology. The so-called morphological typology analysis method is to understand the structure and characteristics (physical properties) of forms through the analytical and conceptual cognitive framework of urban morphology, and to examine the logical relationship (humanistic nature) of the formation and change of these forms in combination with the evolutionary perspective in typology.^[1] Morphology pays more attention to the characteristics of each constituent element of the material space, while typology focuses more on the deep-level historical and cultural connotations and spiritual forces behind the matter. For characteristic Spaces like historical districts that possess both material and cultural attributes, the application of morphological typology can better focus on the features of both material and culture, which is conducive to exploring the deep-level current characteristics of the spatial form of the district.

This paper applies morphological typology to further focus on the characteristics of street spaces in the historical district, breaking down the complex spatial forms within the district into analyzable constituent elements. This approach avoids the one-sidedness of single-dimensional research while

accurately identifying the features of street spaces and their existing issues, thereby providing a research foundation for subsequent quality studies and renewal strategies in the Zicheng district.

2.2 Street space

A street can be conceptually broken down into two material elements: street and road. The "street" is mainly for pedestrians and carries the functions of daily life such as walking, socializing, relaxing and shopping for pedestrians. The "road" is mainly for traffic and is divided into motor vehicle lanes and non-motor vehicle lanes, carrying functions such as urban traffic, citizens' travel, and commuting (Figure 1). The "street" and "road" complement each other and are interdependent, combining the linear traffic path function with the three-dimensional social activity attributes, jointly forming the familiar street space we are familiar with [2].

The mixed attributes of its multiple functions mean that in the process of protection and development, street space not only needs to pay attention to its material form attributes, but also to its non-material functional demands. Functionally, it should take into account the daily life needs of citizens and also be able to become a material carrier of historical district culture. This enables street spaces to become vital mediums for interpreting the city's image and preserving its cultural heritage, thereby advancing the development vision of the Zicheng district as "the city as a scenic zone, tourism as a way of life."

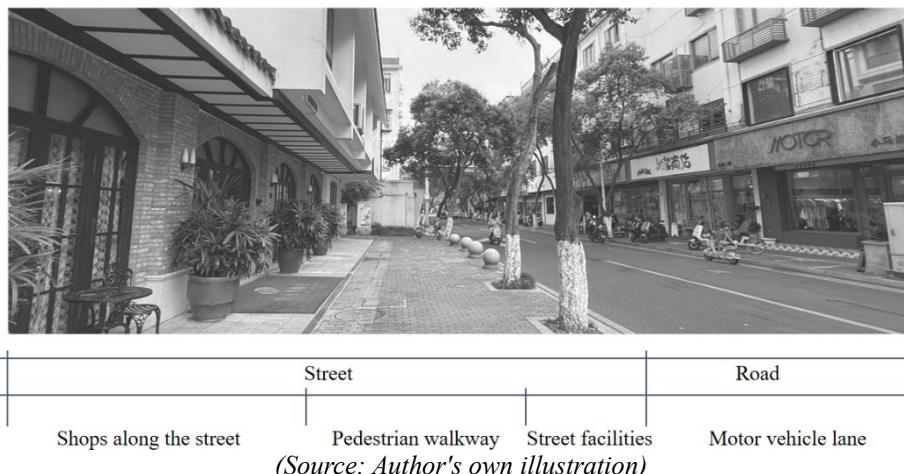


Figure 1: Street space schematic diagram

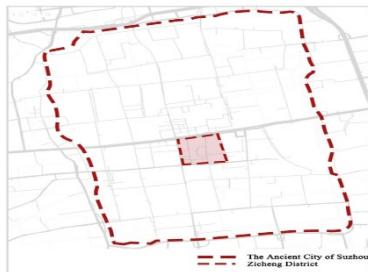
3. The current situation of the Zicheng district in Suzhou

3.1 Overview of the district

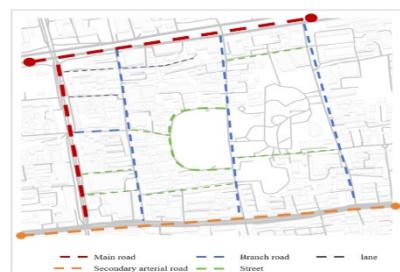
The Suzhou Zicheng district is located in the center of the ancient city of Suzhou. It was the historical site of the Suzhou Zicheng and the starting point of the construction of the ancient city of Suzhou, holding profound historical value. It is also the cradle of Suzhou culture. Within the district, many revolutionary cultural heritages have been preserved, such as the Monument on Wusa Road, the former residence of revolutionary pioneer Zhang Taiyan, and many historical buildings with the architectural style of the Republic of China era. In addition, the Zicheng district is now also a place for citizens to engage in activities and entertainment. Within the district, there are the Suzhou Gymnasium, the Comprehensive Fitness Center and Suzhou Park. Therefore, multiple functions such as history, culture, and leisure and entertainment are interwoven and mixed in this district.

3.2 Current Status of Street Space

The scope of the Zicheng district referred to in this study is the Wusa Road Historical and Cultural Block and its extended part. As the Wusa Road Historical and Cultural Block is of an irregular shape, in the project planning of Suzhou's urban renewal, the Wusa Road Zicheng district is directly expanded into a square as the project unit for protection and renewal, which is the Zicheng district referred to in this article. (Figure 2) The research object of this article is the street space of the main roads above the alley level within the Zicheng district. (Figure 3)



(Source: Author's own illustration)



(Source: Author's own illustration)

Figure 2: Location map of Zicheng District Figure 3: Map of the main roads in the Zicheng district

4. Identification of spatial form elements of streets in the Zicheng District

4.1 Interface

The street interface is the core carrier for the display of the historical district's style and spatial experience. For the Zicheng district, its interface form is not only influenced by the architectural style of the Republic of China era but also bears traces of modern renovation and transformation. Therefore, multi-dimensional classification combining material form and cultural functional attributes is necessary. The street interfaces in the Zicheng district can be classified into four types: native type of the Republic of China era, modern renovation type, cultural integration type, and functional mixed type. The characteristics and distribution of each type are as follows (Table 1).

Table 1: Classification map of street interface elements in Zicheng District (Author's illustration)

Interface type	Specific characteristics	Typical cases
Native type of the Republic of China era	The main body of the building was constructed during the Republic of China period. The main materials for the building facade are plain-colored brick walls, blue bricks and grey tiles. After protective restoration, it not only retains the architectural charm of the Republic of China period, but also can fully display the style.	
Modern transformation type	Most of the buildings are newly constructed in modern times. To blend into the distinctive features of the neighborhood, they draw on the characteristics of traditional architecture in terms of facade form and decorative techniques, thus forming a modern translation of traditional elements. However, some interfaces still have an uncoordinated appearance.	
Cultural integration type	The red cultural buildings have been protected, renovated and revitalized for reuse. Integrating the red historical culture into the interface form can well showcase the red cultural characteristics of the block and create a vibrant humanistic space.	

Functional hybrid type

Some street interface types combine historical traces with modern functional requirements. Due to the lack of systematic planning, the form and function of the interface as well as cultural elements are all mixed. The life elements spontaneously set up by the residents have disrupted the continuity of the neighborhood atmosphere.



Overall, the street interfaces in the Zicheng district are very diverse. However, there is a contradiction between the "protection of historical forms" and the "demands for modern functions and cultural display": it is necessary to retain the interface elements with rich historical value while also updating and developing modern functions. Therefore, differentiated optimization strategies need to be formulated for different types of interfaces.

4.2 Nodes

Nodes are the functional anchor points and experience hubs of street Spaces, and they are the key nodes where pedestrians experience the spatial atmosphere of "beginning - continuation - transition - conclusion" during their walking process. For the Zicheng district, nodes not only undertake the basic functions of transportation connection and activity aggregation, but also carry the core values of historical memory of the Republic of China and the inheritance of red culture. According to their spatial material attributes, the nodes in the sub-city area can be classified as: transportation nodes, functional nodes, and cultural feature nodes (Table 2).

Table 2: Classification map of street node elements in the Zicheng area (Author's illustration)

Node type	Specific characteristics	Typical cases
Traffic node	Traffic nodes are the connection hubs of each street. It mainly serves at road intersections and plays a role in diverting and guiding vehicles and pedestrians. Due to its location at the planned junction, it is often overlooked in the design, thus making it easy for the appearance of the traffic node to be out of harmony with that within the block.	   
Functional node	Functional nodes include commercial and living service functions, with convenient living facilities at the core, undertaking residents' shopping, leisure and social functions. However, due to the intervention of modern techniques, the interface style of some nodes is disconnected from the cultural characteristics of the block, resulting in the intermittent disruption of the block's style.	
Cultural node	Red culture nodes are the core carriers for the inheritance of red culture. Centered on revolutionary historical sites, it also serves the functions of cultural display and commemoration. Although it has outstanding cultural value, it has the problems of single function and shallow experience: it focuses more on visiting and commemorating, lacking interactive experience projects.	
Architectural style node	It is a display node of the architecture and historical texture of the Republic of China era. Taking the intersection points of buildings or historical streets and alleys from the Republic of China period as the core, highlighting the spatial characteristics of the integration of Chinese and Western elements during that period can play a visual role in guiding and attracting people flow.	

Overall, the problem with the street nodes in the Zicheng district lies in the dual demands of modern functions and historical culture: the red culture and the style of the Republic of China era are prominent at the nodes but lack human-oriented facilities; the transportation and functional nodes lack cultural

carrying capacity; the commercial aggregation nodes are active but have different styles from the streets. Therefore, differentiated strategies need to be formulated for different types of nodes.

4.3 Street scale

In "The Aesthetics of Streets", Japanese architect Yoshinobu Ashihara delves deeply into the proportion and scale of street space, the constituent elements of streets, the aesthetics of streets, and the spatial atmosphere, etc., by integrating Eastern and Western regional cultures and architectural practices.^[3] He proposes to define the spatial perception of streets by using the ratio of building height (H) to street width (D) (D/H). This serves as the key criterion for street-scale design. The proportion types of streets in the Zicheng district are rich, and pedestrians have diverse perceptions of scale in space (Table 3).

Table 3: Street scale classification map of Zicheng District (Author's illustration)

Street scale	D/H<1	D/H=1~2	D/H>2
Characteristic	The street has a strong sense of incongruity.	The scale of the street is quite pleasant.	The spatial perception of the street is spacious and open.
Typical cases			

The street and alley system is the framework of a block, fundamentally determining the overall form and layout of the block.^[4] Overall, the core contradiction of the street scale in the Zicheng district lies in the relationship between the historical scale gene and modern functional demands. Most of the streets have a moderate and pleasant scale, but there are also traditional narrow street types that retain historical texture but have a cramped space, and modern wide streets that meet traffic needs but damage the appearance. Therefore, it is necessary to formulate differentiated strategies for different scale types to achieve the return of historical scale and modern demands.

4.4 Public space

Public Spaces are the core carriers in the Zicheng district for residents' daily interactions, tourists' cultural experiences and the display of urban features. Their types and qualities directly affect the perception of the historical atmosphere and the humanistic needs of the district. Based on their functions, the streets in the Zicheng district can be divided into the following categories: red cultural style spaces, architectural display spaces, leisure activity spaces, commercial leisure spaces, and traffic transition spaces. (Table 4)

Table 4: Classification map of public Spaces in the streets of Zicheng District (Author's illustration)

Spatial type	Specific characteristics	Typical cases
Red Cultural Style Space	With the aim of inheriting red culture, it is equipped with functions such as patriotic education, memorial ceremonies, and historical exhibitions. However, the form is monotonous. Interactive cultural experience models can be incorporated to enhance the cultural atmosphere of the neighborhood.	
Architectural Style Display Space	With the aim of perceiving the architectural and street features of the Republic of China period, the style experience and the function of slow traffic are combined to present the historical texture of the Zicheng district in a dynamic way, creating a distinctive space for wandering.	
Leisure Activity Space	Mainly featuring small open Spaces or street intersection nodes, it combines living services with leisure activity functions, allowing citizens to engage in small-scale social and entertainment activities here.	

Commercial Leisure Space	The district is mainly composed of street-front shops, mostly modern and young commercial brands. It integrates modern commercial elements into historical districts, combines commercial services with pedestrian leisure functions, and promotes citizens to consume while sightseeing.	
Traffic transition space	Most of them are at the intersections of major urban roads or bus stops, aiming at traffic connection and short stops. Service is given priority, and reasonable planning is carried out to reduce the walking experience of pedestrians.	

5. The classification of street types in Zicheng District

The types of streets can be classified from multiple dimensions. As proposed in the "Shanghai Street Design Guidelines" issued by the Shanghai Municipal Bureau of Planning and Land Resources in 2016, streets can be classified into five types based on factors such as their traffic functions, activities along the street, and street landscape features: "commercial streets, living service streets, landscape and leisure streets, traffic-oriented streets, and comprehensive streets".^[5] At the same time, they can also be classified according to the road grade, cross-sectional form, length and attributes of the streets. Based on various guidelines and in combination with the types of streets and alleys in Suzhou, the streets at the lane level and above in the Zicheng district can be classified as follows (Table5).

Table 5: The classification map of street types in the Zicheng District (Author's illustration)

number	Name	Road grade	Length	Street attributes
1	Ganjiang East Road	Arterial Road	About 578m	Traffic
2	Renmin Road	Arterial Road	About 565m	Comprehensive
3	Shizi Street	Collector Road	About 618m	Life & Culture
4	Gongyuan Road	Local Road	About 628m	Life & Landscape
5	Wusa Road	Local Road	About 606m	Life & Culture
6	Jinfan Road	Local Road	About 578m	Life & Commerce
7	Tongguan Fang	Local Road	About 128m	Life
8	Caoqiao Alley	Street	About 191m	Life
9	Mingzhi Road	Street	About 251m	Life
10	Huanti Road	Street	About 417m	Traffic
11	Huangfeiji Road	Street	About 98m	Life & Culture
12	Tiyuguan Road	Street	About 216m	Life & Culture
13	Chuanxin Street	Street	About 130m	Life & Landscape
s14	Daxin Street	Street	About 129m	Life
15	Zhangguolao Alley	Alley	About 133m	Residential
16	Qiangengzi Alley	Alley	About 166m	Residential

Overall, the types of streets in the Zicheng district are diverse and complex. During their development, streets do not have a single function but are a mixture of multiple functions, capable of meeting the diverse needs of citizens' lives and tourists' experiences. Therefore, their attributes cannot be absolutely defined by a single type. Thus, under the future development trend of roaming districts, it is necessary to optimize and build streets based on their main functions. This urban design strategy aims to make each street have its own thematic characteristics while integrating multiple functions, so as to enrich the walking experience of pedestrians strolling through the streets.

6. Strategies for the Protection and Renewal of Street Spaces in the Zicheng District of Suzhou

6.1 Street interface Classification repair

The street types in the Zicheng district are diverse and mixed. In response to the existing problems at the interface, such as the scattered architectural style of the Republic of China era, conflicts with modern renovations, and mixed functions, differentiated restoration was carried out according to the interface types. At the same time, the uniformity of the style was strengthened to maintain the "continuity of the interface". For instance, we should carry out protective renovations to restore the historical texture of the architectural styles and façades. For façades that have undergone modern alterations, the goal is to

remove incongruous elements and retain the essential ones, maintaining stylistic harmony and avoiding a sense of conflict along the same street. Additionally, the functions of the streets should be integrated to make their purposes clearer.

As Kevin Lynch said in "The Image of the City": " A highly imagery city should look appropriate, unique and unusual, and should be able to attract visual and auditory attention and participation..." This kind of city has a highly continuous form, with many distinctive parts clearly connected to each other, and can gradually be understood. ^[6]

6.2 Red cultural elements empower street Spaces

In response to the issues of the single form of inheritance of red historical memory and the low participation of young people, the red culture is extended from the memorial hall to the entire street through spatial design. For instance, historical scene restoration design can be carried out, historical scenes can be displayed through light and shadow in the node square, or red activities can be integrated into daily Spaces, and red activities can be held regularly in the street.

6.3 Create an immersive experience street with the style of the Republic of China era

Extend the interface of the buildings with the style of the Republic of China era to create an immersive experience street of "point-line-surface", allowing pedestrians to have continuous experiences during their walk. At the same time, a Republic of China life skills experience station can be introduced, inviting elderly residents who master hand sewing and traditional hairdressing skills to set up temporary stalls in the streets and alleys to create a flavor of the Republic of China era.

6.4 Optimization of Basic Experience Facilities

By adopting "micro-intervention" technology, infrastructure is made invisible, and traditional-style facilities are used, such as preserving the traditional historical paving style and street lighting facilities, etc. In restoring traditional architectural interfaces and street surfaces, etc., historical traces are preserved, such as the mottled appearance of walls; We should optimize key nodes, such as the often-overlooked spaces within narrow side alleys, which currently lack barrier-free facilities. Simultaneously, small rest areas should be added at alley intersections to enhance daily convenience for the elderly and children. Furthermore, it is essential to continue identifying culturally significant thematic elements and presenting them through cultural signage, sculptural installations, and other forms to enrich the street's cultural character.

At the same time, continue to explore theme elements with cultural connotations and display them through cultural symbols, sculpture landscapes and other forms to guide the cultural trends of historical and cultural districts. Once the cultural atmosphere is formed, its value without form is incalculable. Targeted urban renewal projects will further drive the development of the commercial and tourism industries ^[7].

6.5 Innovation in Management Mechanisms.

Establish a multi-subject collaborative update mechanism. The government formulates the "Guidelines for Street Spatial Form", clearly defining control indicators such as interface, scale, and style. The local urban management bureau will establish a "Street Protection Association" for residents to participate in the decision-making of the update plan. A "style guarantee deposit" system will be implemented for merchants. The deposit will be deducted from those who violate the regulations for renovation and used for restoration. People-oriented urban renewal concepts will make the self-established actions truly become dynamic and living protective measures ^[8].

7. Conclusions and Outlook

From the perspective of morphological typology, this article, in combination with the core attributes of the Zicheng district such as the style of the Republic of China era, red culture, and citizens' leisure, sorts out the spatial morphological characteristics of the streets in multiple dimensions, and then proposes targeted optimization strategies based on the existing problems. It is hoped that this research can provide a reference for the protection and renewal development of the street spatial form in the Zicheng district

of Suzhou, and promote the development of the slow-moving streets in the Zicheng district. Of course, this research also has certain deficiencies. It lacks the application of big data and technology, the physical spatial form still needs to be further explored, and there is a lack of attention to the subjective experience of the street users. Further research can be conducted in the future.

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