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DESIGN OF PEDESTRIAN STREET ENVIRONMENTS BASED ON BEHAVIORAL TYPOLOGIES: PAUSING AND PASSING

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Abstract. ***Purpose.*** *The article examines the categorization of pedestrian behavior and the characteristics of pedestrian street environment design, emphasizing two fundamental behavior types – pausing and passing. The primary objective is to develop new approaches and methodologies for designing pedestrian streets, enabling the optimal organization of spaces oriented toward the needs of pedestrians.*

Methodology. *The research is based on a comprehensive literature review and analysis of scientific publications related to pedestrian behavior and street design. A typological analysis is employed to systematize existing classifications of pedestrian activity, taking into account the features of both pausing and passing.*

Results. *The findings indicate that effective design of pedestrian environments requires dividing the space into zones designated for pausing and passing. It has been determined that spatial characteristics, such as ergonomics, material selection, color palette, and architectural elements, play a key role in creating a comfortable and functional pedestrian environment.*

Scientific novelty *of the research lies in the application of a typological approach to the analysis of pedestrian behavior, which has enabled the formulation of new concepts and methodological recommendations for the design of street environments oriented to the needs of pedestrians.*

Practical relevance. *The obtained results serve as a theoretical foundation for further planning and design of pedestrian street environments, contributing to enhanced safety, comfort, and attractiveness, which in turn will improve the quality of the urban environment.*

Keywords: *pedestrian behavior, streetscape design, environmental design, design objects, colors, materials, pedestrian environments, public space design, ergonomics, urban design.*

INTRODUCTION

Pedestrian behavior exerts an impact on the environmental design of street space. Environmental design requires in-depth research on pedestrian behavior's motivations, route choices, and psychological needs. Evidently, after conducting corresponding psychological analyses of the walking behaviors of different groups of people at different times, seasons, and locations, summarizing relevant walking types is of particular importance. This paper lists the classifications of pedestrian behavior in

urban public spaces proposed by scholars in various regions.

Based on the two most fundamental behavior types, namely pausing and passing, this paper conducts an analysis, summarizes the relevant spatial effects in design theories, and, through case studies, concludes the design methods corresponding to the respective pedestrian behavior types.

ANALYSIS OF PREVIOUS RESEARCH

Scholars and designers have different interpretations from various perspectives when studying the types of pedestrian behavior, so the classification is diverse.

Jan Gehl's classification principle based on the internal motivation of activities greatly influences the design academic community. This principle divides pedestrian behavior into necessary, spontaneous, and social activities [2].

Many classification studies of pedestrian behavior are based on this principle. For example, in the study of behaviors in Chongqing's walking spaces, scholars such as Yang classify pedestrian behavior into necessary activities, including halting behaviors like resting and waiting, and passing-through behaviors such as commuting to school and work; spontaneous activities, including purposeful behaviors like fitness and jogging, and non-purposeful behaviors such as strolling and walking the dog; in addition, social activities, such as on-site games and neighborhood chats, are classified as a separate category [14].

Some scholars divide pedestrian behavior and corresponding spaces in urban blocks into five types, starting from the location and purpose of activities. The first is fast walking, which is walking with a clear purpose, and the space is often allocated on the side of the sidewalk closer to the roadway. The second is slow walking, which is walking without a clear purpose, and in design, it is often allocated in the middle of the sidewalk or on the side slightly farther from the roadway. The third is strolling, which involves shopping, visiting neighbors, or chatting between the shops on both sides of the street, and it occurs on the side closer to the street boundaries, such as shops. The fourth is sight-seeing walking, which means walking slowly or halting to enjoy the scenery. It takes place on the side with beautiful scenery and is farther from the roadway in the walking space. The fifth is the resting behavior, which is often designed on the side farther from the roadway or outside the walkway [15].

Dean et al. also classified the purposes of residents' walking trips into three categories based on travel purposes: commuting trips, daily life trips, and recreational trips [1]. Meanwhile, a large number of studies have found that various variables of the street environment space types may explain the reasons for choosing to walk: the walkability of the walking environment, such as the presence of sidewalks, average sidewalk width, number of turns, and climate-comfort design [6], etc., have stimulated the residents' willingness to walk.

In addition, the environmental design of public spaces also affects walking preferences and the choice of walking behaviors [12]. The attractiveness of landscapes and amenities, such as the number of shops, the use of green spaces or parks, the accessibility of the nearest transportation, and the use of public places, all influence the likelihood of residents walking [5].

According to the literature research, it is found that even though the classification methods of walking behaviors are based on different behavioral perspectives, their basic prototypes all come from the two categories of pausing and passing. From the underlying logic, the walking preferences influenced by the remaining landscape facilities are also the design of the halting spaces and passing spaces for pedestrians.

PROBLEM STATEMENT

Based on the discussions on the types of pedestrian behavior in the above-mentioned literature, this paper conducts an analysis based on the two most fundamental behavior types: pausing and passing. It summarizes the relevant spatial effects in design theories and, through case studies, concludes the design methods corresponding to the respective pedestrian behavior types.

THE RESULTS OF THE RESEARCH AND THEIR DISCUSSION

Based on the two major characteristics of pausing and passing in pedestrian behavior, this paper classifies the pedestrian-friendly street environment into two spatial types: passing-through and dwelling spaces. The behaviors in passing-through spaces and dwelling spaces of streets describe different activities and behavior patterns of people on the street.

Typical pausing behaviors in street spaces are rich and diverse, including conversations, chats, board-and-card games, recreational activities, playing with water, photography, dining, walking the dog, commodity sales, street performances, etc. These behaviors cover the typical activities that may occur in public spaces. Among them, some behaviors

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have spontaneous or non-spontaneous commercial attributes, some are closely related to residents' daily life habits [8], and some can only be realized by relying on the natural environmental elements of the space [17]. Pausing-type behaviors reflect people's utilization and enjoyment of street spaces and are an important part of urban life.

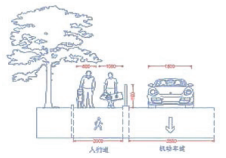
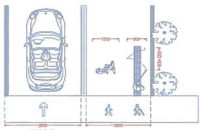
Passing-type pedestrian behaviors mainly refer to the purposeful passing-through activities of citizens on the street, that is, moving from one place to another. Such behaviors are often accompanied by fast and short-term movements, such as office workers during their commuting trips or shoppers moving between different stores. There are various ways to achieve this, including walking, cycling, and driving. People usually walk straight through the street without staying too long at a specific location. Moreover, waiting behaviors with a low possibility of staying in the street walking space and short-term halting behaviors with no more than ten minutes can also be classified into this category [13].

Combining the above-mentioned classification research foundation and the research needs of different activity types for pedestrian research, this paper selects the traveling state and the degree of necessity of pedestrian behavior as classification criteria. It divides street pedestrian behaviors into two major categories: passing-type pedestrian behaviors and lingering-type pedestrian behaviors. Passing-type pedestrian behaviors are further divided into necessary and non-necessary passing activities; lingering-type activities are divided into non-necessary and necessary lingering activities (table 1).

Design theories and methods for pausing behavior. The spatial patterns reflected by dwelling behavior can be divided into halting and sitting-resting spaces. Through behavioral analysis of the user groups, the environmental spaces suitable for halting can be

Table 1

Walking behavior activity classification

Activity type	Typical walking behavior	Activity characteristic	Required condition	Spatial and object-based content elements
Necessary passing-like walking behavior	Commuting to and from school, including parent pick-up and drop-off, transportation transfer, express routes	The purpose of walking is strong, the frequency and time of walking are fixed, and the pursuit of walking accessibility is prominent	**Design elements:** guided design, safety design, simplicity design **Ergonomics:** The street width should be able to meet the parallel passage of two people, generally at least 1.5–2 meters, the maximum slope should not exceed 8%, the staircase, the step height between 15–17 cm, the step width is about 30–32 cm	 
Nonessential passing-like walking behavior	Walk, wander, run, go in and out of stores, stop for a moment, say hello, look at the window signs	Walking is its purpose, the occurrence is more random, the street traffic capacity and public service capacity have certain requirements	**Design elements:** fun design, landscape design, flexibility design **Ergonomics:** The landscape walking path with the function of walking can reach 3–5 meters, the height of the flower bed is 0.6–0.8 meters, and the small sculpture is 1.5–2 meters	 
Necessary stay-type walking behavior	Waiting, cleaning and maintenance	Public service activities, walking environment has an impact on its existence	**Design elements:** functional design, zoning design, order design **Ergonomics:** The per capita stay area is greater than 1.5–2 square meters, the outdoor seat height is 40–50 cm, the lighting is moderate, the color is soft and warm	 

Continuation of table 1

Nonessential stay-type walking behavior	Rest and communication, entertainment, sports and fitness, street performance	The purpose of walking is weak, the movement is more free, and the pursuit of social interaction and exchange is prominent	**Design elements:** leisure design, cultural and artistic atmosphere creation, flexibility and adaptability design **Ergonomics:** The material selection of rest facilities should pay attention to the sense of touch, the distance between the seats in the private space is about 0.5–0.8 meters, and the distance between the seats in the open area is about 1–1.5 meters	

Figure credit: author's drawing

classified into three spatial effects: ***the edge effect***, ***the alcove effect***, and ***the interface effect*** [18].

In environmental design, the edge effect refers to the tendency of people to stay at the edges of spaces in the street environment. The street edge is usually the junction of the building facade and the street space, and this location gives people a sense of psychological support. From a behavioral perspective, people feel safer at the edge because they have a relatively stable building as a support behind them while being able to observe the activities on the street.

For example, people will naturally gather or briefly stop under the street buildings' eaves or near the shops' entrances. This edge area is like a transitional zone between the interior's private space and the street's public space, providing a buffer for people's activities [7].

Based on the well-known edge effect, various design strategies in environmental design are often employed at spatial boundaries. For example, when designing a building entrance and its transitional porch area, a colonnade-style porch with a width of 2–3 meters can serve two purposes: it provides shelter from wind and rain for people entering and exiting the building, and it creates an attractive boundary space where people can linger. People can wait for others, adjust their clothes, or observe the street situation under the porch. Take the Suzhou Creek Wuning Road Bridge Under-bridge Station as an example. It uses the under-bridge transitional space to create a community rest and communication space, activates the negative space, and improves the environmental quality (table 2-a).

Another example is the transparency design of the building's ground-floor space, which has been proven effective [4]. The ground floor of the building uses transparent glass curtain walls or large-area windows to visually connect the indoor and outdoor spaces, forming a blurred boundary. In commercial buildings, this transparent design can display the indoor commercial activities on the street, attracting the attention of passers-by. At the same time, people indoors can also see the street view outside, increasing the attractiveness of the boundary area [21].

For example, in the renovation and renewal of Yucheng Street in Jinjiang District, one of the busiest blocks in Chengdu, China, designers used large-area colored glass and transitional spaces to create street-side shops, improving the previously closed street interface. The result has enhanced the commercial value of the street and the walking experience (table 2-b).

An alcove originally refers to a small space chiseled out of a wall. In the street environment, there are similar relatively independent and semi-enclosed small spaces, and the effect they bring is called the alcove effect. Such spaces may be the recessed corners of the street, the small courtyards between buildings, or the areas surrounded by green plants. They are like the alcoves in a building, making people feel more comfortable and private, thus attracting people to stop. In such spaces, people can avoid the crowds and noise of the street to a certain extent and enjoy a relatively quiet environment suitable for private activities such as chatting and reading.

In street-space environmental design, the alcove effect means creating semi-enclosed and semi-private spaces similar to alcoves, allowing people to maintain a certain connection with the outside world while having a relatively independent and quiet personal space. These spaces can be either physical recessed structures or formed by enclosing elements such as furniture and green plants. For citizens, the recesses of buildings, recessed entrances, porches, corridors, and front-yard trees all have similar functions, providing protection and a good view. Therefore, in the design of public spaces, the "alcove effect" principle should be followed to create more friendly spaces and attract more citizens to use the public space.

Table 2

Design strategies and case studies for pausing behavior in street spaces

Spatial Effect	Edge Effect		Alcove Effect		Interface Effect	
Design Methods	**Gray space design**	**Transparency design**	**Installation of landscaped alcoves**	**Utilization of urban furniture**	**Architectural interface design**	**Ground interface design**
Case Information	**a.** Suzhou River Wuning Road Bridge station, Shanghai, China / Zhizheng Architecture Studio	**b.** Renovation and renewal of Yucheng Street, Jinjiang District, Sichuan, China / Fanzhu Design	**c.** Zao Xia Village Street Renovation Design, China / Shenzhen, Self-organized Space Design	**d.** Yannan Avenue renovation design, Chongqing, China / Chongqing, WallaceLiu	**e.** The Roof, Shanghai, China / ASPECT Studios	**f.** I LOVE STREET, Seosuk Elementary School, Gwangju, South Korea / MVRDV
Case picture						
Case study	Utilizing the gray space under the bridge to create a community open space for communication, positively transforming the negative space and enhancing the environmental quality.	The designers used large areas of stained glass and gray space to create stores along the street, improving the previously closed street interface.	Through boundary remodeling, the design organizes the original negative space and creates a landscape notch to reactivate the local culture and re-construct the daily communication of the neighborhood.	The construction of some landscaping features, hanging canopies made of colored Plexiglas panels, helps to improve the gray tones of the surrounding area while providing a psychologically safe shelter for the pedestrian space	The designer boldly used red steel plates on the entire building façade at the boundary of the pedestrian space, bright colors to enhance the attractiveness of the space and stimulate the spatial perception of pedestrians.	The designers have created decorative and functional public space using different forms of pavement where kids can sit, paint, jump on a trampoline and play in the sand

Given the effect of the alcove effect in improving the quality of public spaces, the following methods are often applied in environmental design. The first is to use building recesses. Recessed porches, balconies, window sills, etc., are set in the design of buildings on both sides of the street. These recesses can serve as spaces for people to stop briefly, take shelter from the wind and rain, or observe the street. At the same time, they also add richness to the building facade. The second is to set up landscape recessed areas. Small recessed gardens, squares, or rest areas are created in the street landscape design. Through the micro-undulation of the terrain, the enclosure of plants, etc., a relatively independent space is formed where people can rest, enjoy the landscape, and experience a different spatial atmosphere from the surrounding streets. The third is to use furniture and facilities. Some small alcove-like spaces are enclosed on the street by reasonably arranging benches, flower boxes, screens, and other furniture and facilities. These spaces can be flexibly set at street corners, under big trees, etc., providing temporary stopping and resting places for pedestrians.

For example, in the street renovation design of Zaoxia Village in Shenzhen, many landscape recess design methods were used. The original negative space was organized through boundary reshaping to form landscape recesses, re-activating the local context, and reconstructing the daily communication in the Zaojie area (table 2-c). Another example is the renovation design of Yannan Avenue in Beida Resources, Chongqing. The construction of some urban furniture and landscape facilities has added many interesting activity spaces to the street. The designer deliberately used a canopy composed of hanging colored organic glass plates, which

helps improve the surrounding gray tone and provides a psychologically safe shelter for the walking space (table 2-d).

The interface includes the street-facing facades, building surfaces, and the ground. The interface effect refers to the influence of these interfaces on the street-space environment, people's behaviors, and feelings through their own characteristics and interactions. It is the key to creating an affable space. A rich and changeable interface can provide interesting visual landscapes, meet people's psychological needs for capturing interesting information, enhance the attractiveness and vitality of the street, and promote interaction and communication between people and the street [16]. It can be achieved through various designs. For example, using different colors, materials, and textures for the street-facing facades; setting up special doors, windows, and balconies; making artistic treatments on the building surfaces; adding murals and reliefs; and reasonably planning the ground, using different paving materials and patterns to divide functional areas.

The interface effect is mainly reflected in the influence of the interfaces of buildings, the ground, and facilities in the street on people's halting behavior. The building interface's color, material, and transparency affect people's visual perception and psychological reactions. For example, a brightly-colored facade and a transparent window display will attract people's attention and make them stop. The ground interface's flatness, texture, and pattern also affect people's willingness to stay. Facility interfaces such as public art installations and information display boards can also attract people to stop. Generally, a marble-paved square is more comfortable than a gravel-covered ground, and a street-facing facade with rich colors is more pleasing than a dull gray one. An interface with a sense of art and vitality will attract people to stop, which may indicate potential activities. When the space interface has attractive points, it can capture people's attention and bring a sense of pleasure. It explains why there are more people on pedestrian streets during holidays and why ancient alleys or creative small spaces make people linger. Shrewd people set up stalls here, obtaining economic benefits, enriching the space content, and enlivening the overall atmosphere.

Among the design methods corresponding to the interface effect of street spaces, the interface design of buildings and the ground is particularly important. Color application and material selection should be paid attention to in building interface design. In this case, it is necessary to choose vibrant and warm colors for the building to attract pedestrians' attention. For example, on the commercial streets in Shanghai, bright contrasting colors such as red and green are used as the main or decorative colors of the buildings, attracting the attention of pedestrians, stimulating walking perception, and increasing walking excitement. In terms of material selection, it is necessary to use textured building materials such as wood and stone to increase the attractiveness of the building. For the decoration of the building facade, techniques such as relief and mosaic can enrich the building interface layers [13]. For example, in the design of "the roof" in the old urban area of Shanghai by the famous architect Jean Nouvel, the designer boldly used red steel plates on the entire building facade at the boundary of the walking space. The bright color enhanced the spatial attractiveness and stimulated the pedestrians' spatial perception.

In ground interface design, attention should be paid to material texture and pattern design. It is necessary to select ground materials with different textures. For example, using wooden floors for the walking path part to give people a warm and natural feeling and using granite in public areas such as squares to show an atmosphere of grandeur and stability. Also, interesting patterns, such as cultural and geometric designs, can be created on the ground. The patterns' size and style should match the street's overall style, which can be achieved by splicing colored floor tiles or carving (table 2-e). MVRDV, in cooperation with the local community in South Korea, completed an experimental street-walking environment design in Gwangju – "I LOVE STREET". Through cooperation with Seosuk Elementary School, the design team understood a series of children's needs for the street and created different road surface forms for them. Children can sit, paint, jump on a trampoline, and even play with sand in this space. A real text emerged by designing a series of English letters on the road surface, with 'I love' reflecting children's love for different things. At the same time, the square space at the end of the text was left blank for everyone to use. It is like a canvas where children can paint and adjust (table 2-f).

Design theories and methods for passing behavior. Walking is the simplest and most common way for people to travel from one place to another. In the early days, cities were small in scale with few motor vehicles, and roads were mostly mixed-traffic (for pedestrians, rickshaws, and animal-drawn vehicles), with walking spaces taking the dominant position. In modern cities, with the changes in urban scale and form,

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walking retains its original value and functions and has become an integral part of the urban transportation system. Usually, walking spaces are constructed according to road-system planning and traffic rules, often focusing only on their traffic attributes while neglecting their role in enhancing and improving the quality of urban public spaces. In modern society, whether the walking space is comfortable largely affects or even determines the degree of residents' affection for the community or the city. Therefore, many countries have elevated the attention to walking spaces to the level of concern for the image of urban public spaces and the quality of public life. Jan Gehl pointed out that the walking environment encompasses both physical and psychological aspects, which jointly determine the user experience of pedestrians, and this experience, in turn, affects the quality of people's public life. For example, when walking on a pedestrian street with a wide variety of goods on display, people will forget their fatigue due to the pleasure of appreciation; while walking under a cold and high wall, they will feel frightened due to the cold environment and thus quicken their pace. Based on observing and reflecting on people's daily behaviors and lives, this paper sorts out three spatial effects guided by design theories and ergonomics and summarizes the corresponding design methods in combination with different cases.

Most street spaces inherently possess the axial effect. The axis of a street has a guiding and directional function on people's behaviors and perceptions. When people pass through a street, they will naturally move forward along the axial direction of the street, and the street axis becomes a key factor guiding the flow of people and vehicles, giving people a clear sense of direction. From the perspective of behavioral perception, when people walk on a straight street, the deviation angle between the walking direction and the street axis is generally less than 15°, indicating that the street axis strongly guides people's walking direction. Therefore, designers often adopt design methods such as strengthening the axis guidance and setting up an axial landscape sequence in designing many newly planned pedestrian streets, which have been continuously proven effective through academic research [9].

These methods can clear and straighten the street axis, reducing unnecessary bends and turns. For example, setting up landmark buildings or landscapes at the starting and ending points of the street to strengthen the sense of the beginning and end of the axis and arranging a series of landscape elements along the street axis, such as greenery, sculptures, fountains, etc., to form a continuous visual landscape that attracts people's attention and guides them forward. Similar cases include the pedestrian street of Grand Tang Mall in Xi'an, China, which uses narrative-style landscape sculptures to create the axis of the pedestrian street, reproducing the historical context and creating a landscape sequence in the walking space at the same time [20] (table 3-a).

Another example is the renovation of the walking path of Zhenhua Primary School in Kunshan. A series of children's entertainment nodes are connected by yellow walking-guiding lines to form a landscape sequence, adding guidance, fun, and pleasure to the students' way home after school (table 3-b).

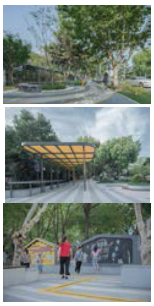
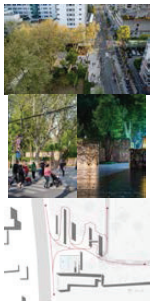
The territorial effect is also a factor that cannot be ignored in the design of street walking spaces. During the walking process, pedestrians will have a sense of belonging and territoriality to a certain range of space. Generally speaking, when people walk on the street, they have a strong sense of territoriality for the space within 0.5–1.5 meters from their bodies, believing that this is their personal space. If others enter this space, it may cause discomfort. There is currently no widely accepted standard for the "crowdedness" of streets. When studying cases in New York in 2008, Gehl found that on a 10-meter-wide street, if about 120 people pass through per minute, it will give people a sense of crowding [3]. Therefore, he proposed that on a 1-meter-wide street, when the number of pedestrians passing through the road interface per minute reaches 12, it should be regarded as reaching the crowding limit. In street design, if different small spaces can be divided to give pedestrians psychologically a sense of belonging to a certain area and reduce the sense of crowding, the comfort and attractiveness of the street will be enhanced.

At the same time, in the design, the fluidity and continuity of people in the street space are also emphasized, and obstacles and interferences are appropriately reduced. According to research, in a smooth street environment, the average walking speed of pedestrians is about 1.2–1.5 meters per second, while in a congested environment, the speed will drop to 0.5–0.8 meters per second; therefore, it is also particularly important to ensure the efficient passage of pedestrians [10].

In design methods based on the territorial effect, the creation of semi-private spaces is required. Semi-enclosed areas may be incorporated into the street, such as spaces under pavilions and along flower racks, to provide

Table 3

Design strategies and case studies for passing behavior in street spaces

Spatial Effect	Axial Effect		Territorial Effect		Exploration Effect	
Design Methods	**Strengthened axial guidance**	**Setting landscape sequences**	**Creating semi-private spaces**	**Personalized guide design**	**Pedestrian flow diversity**	**Diversity of facade elements**
Case Information	**a.** Datang Nocturnal City Walking Street, Xi'an, China / China Northwest Architecture Design Institute	**b.** Renewal of walking path at Zhenhua Elementary School, Kunshan , China / H+L Studio	**c.** Tianbao Road Entrance Renewal, Shanghai , China / Zizheng Architecture Studio	**d.** High Line Park II, New York, USA / James Corner Field Operation	**e.** Hassalo on Eighth, Oregon, USA / PLACE	**f.** Jixiang Street Neighborhood Renewal, Wanzhou District, Chongqing, China / WTD GROUP
Case picture						
Case study	Walking space with narrative sculpture as the axis, a linear layout, guiding walking behavior	Use yellow pedestrian guide lines with, children's entertainment nodes to form landscape sequences	The use of spatially dislocated view walls creates mobility in the walking path while providing semi-private spaces	Old elements such as railroad tracks and turnouts serve both as cultural symbols and as personalized guides for the pedestrian space.	The monotonous straight pavement is designed to become a meandering and rich pedestrian space through the use of greenery and the division of paving materials.	Display and screening of street boundaries with yellow steel panels, perforated aluminum panels and other façade materials

relatively private zones for pedestrians, satisfying the need for a sense of territory and ensuring the continuity and integrity of the walking space [19]. Simultaneously, personalized wayfinding design should be considered. A continuous slow-traffic system may be established, and personalized decoration of different areas may be implemented through techniques such as varied paving colors or materials and the installation of unique signage to enhance the recognizability and territorial sense of the area while maintaining spatial fluidity.

For example, in the renovation design of the entrance of Tianbao Road in Shanghai, China, several layers of dry-laid rubble landscape walls with spatial misalignment are used, and a cascading water-feature flower bed is arranged in the L-shaped recess between the landscape wall and the adjacent building on the south side, forming the fluidity in the walking path and providing a semi-private space at the same time (table 3-c). Another example is the second phase of the High Line Park in New York, USA. The site was renovated from the original abandoned railway, so old elements such as railway tracks and turnouts are retained as cultural symbols running through the entire linear space and also play a role in the personalized guidance of the walking space (table 3-d).

In street-environment design, merely meeting the basic needs of pedestrians to pass through is not enough; the interestingness of the street space also needs to be explored to guide pedestrians to walk. It belongs to the exploration effect in behavioral perception. Pedestrians often desire to explore when walking and are more interested in novel, interesting, and changing elements and spaces in the street. From the perspective of behavioral perception, rich landscapes, diverse architectural styles, hidden paths, and other elements in the street will stimulate pedestrians' desire to explore. According to the survey, in streets with rich landscapes and changes, the walking distance of pedestrians will increase by an average of 20%–30% compared with ordinary

streets because various novel things will attract them, and they are willing to walk more to explore [11].

Therefore, in spatial design aimed at enhancing the exploration effect, using winding paths and creating architectural diversity are two design methods to enrich spatial perception. Some winding or branching paths should be incorporated into the street, leading to different areas or scenic spots to stimulate curiosity. Simultaneously, the buildings on both sides of the street should be varied in style, color, and form to provide rich visual experiences for pedestrians.

For example, Hassalo on Eighth, a community street in Oregon, USA, which won the 2019 ASLA Award, the designer used methods such as greenery and paving-material division to design the monotonous and straight road surface into a winding and rich walking space, providing people with a more story-filled walking experience (table 3-e). Another example is the block renewal of Jixiang Street in Wanzhou. Facade materials such as yellow steel plates, perforated aluminum plates, and grid arches display and block the street boundary, enriching the building facade and stimulating the desire for walking exploration simultaneously (table 3-f).

CONCLUSIONS

This paper begins with a typological study of street walking spaces, organizing and summarizing classifications proposed by various scholars. It concludes that there are two fundamental walking patterns, pausing and passing, from which secondary subtypes in different scenarios are derived. Corresponding design theories and methods for these behaviors are systematically summarized, identifying six spatial effects and twelve design principles, each illustrated with specific examples. The findings of this study may serve as a useful reference for future typological research on street walking spaces and offer valuable design insights for the planning, construction, and renewal of pedestrian-oriented street environments.

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Ван Кань, Шмельова-Нестеренко О. Є. Дизайн середовища пішохідних вулиць на основі поведінкових типологій: зупинка та проходження. *Теорія та практика дизайну. Культура і мистецтво.*
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АНОТАЦІЯ

Ван Кань, Шмельова-Нестеренко О. Є. Дизайн середовища пішохідних вулиць на основі поведінкових типологій: зупинка та проходження

Мета. *У статті досліджується категоризація пішохідної поведінки та особливості дизайну середовища пішохідних вулиць із фокусом на два ключові типи активності – зупинку та проходження. Основна мета дослідження полягає у розробці нових підходів і методологій до дизайну пішохідних вулиць, що дозволять оптимально організувати просторове середовище відповідно до потреб пішоходів.*

Методологія. *Дослідження базується на комплексному огляді літератури та аналізі наукових публікацій, присвячених пішохідній поведінці та дизайну вуличних просторів. Використано типологічний аналіз для систематизації існуючих класифікацій пішохідної активності, із врахуванням особливостей як зупинки, так і проходження.*

Результати *дослідження свідчать, що ефективний дизайн пішохідного середовища потребує просторового поділу на зони, призначені для зупинки та для проходження. Встановлено, що просторові характеристики, такі як ергономіка, вибір матеріалів, кольорова палітра та архітектурні елементи, відіграють ключову роль у створенні комфортного та функціонального пішохідного простору.*

Наукова новизна *дослідження полягає у застосуванні типологічного підходу до аналізу пішохідної поведінки, що дозволило сформулювати нові концепції та методологічні рекомендації щодо дизайну вуличного середовища, орієнтованого на потреби пішоходів.*

Практична значущість. *Отримані результати можуть слугувати теоретичною основою для подальшого планування та дизайну пішохідних вуличних просторів, сприяючи підвищенню їхньої безпеки, комфорту та привабливості, що, своєю чергою, покращить якість міського середовища.*

Ключові слова: пішохідна поведінка, дизайн вуличного ландшафту, дизайн середовища, об'єкти дизайну, кольори, матеріали, пішохідне середовище, дизайн громадського простору, ергономіка, міський дизайн.

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