Study on Environmental Behaviors in the Outdoor Landscape Space of Taikoo Li Commercial Block

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Abstract: Under the guidance of the environment-behavior theory, researches carried out a questionnaire survey as well as a field observation and analysis on the fixed time and fixed location, so as to study the influence of environmental factors on pedestrians' behavior stimulus, behavior restrictions and social distances in the commercial block. It is found that there are abundant landscape elements and good environmental stimuli in the slow area of Taikoo Li commercial block, but the stimuli of some nodes in the fast area are insufficient. Rainy and hot days can restrain the behaviors of pedestrians; most citizens choose to act under the corridor with top interface. The social activities in the main squares are mostly individuals' spontaneous behaviors. It shows that Taikoo Li has the vibrant business environment and the excellent leisure atmosphere.

1. Introduction

The diversification of public social needs and the pluralism of cultural development promote the outdoor landscape space of commercial blocks to transform from single function to complex functions. For citizens in modern cities, the outdoor landscape space of commercial blocks has become a multi-functional place to shop, communicate and relax; that space has the characteristics of "openness" and "interaction". Citizens are main users of outdoor landscape space; their behaviors are influenced by the landscape space. People in the city are also the most influential judges who can evaluate the usage experience of these spaces. The outdoor landscape spaces of different commercial blocks bring different shopping feelings to citizens. On one hand, people choose the store environment according to their shopping needs. On the other hand, the characteristics of landscape spatial forms, in turn, affect people's shopping behaviors. [1] To study which methods can enhance the charm of commercial blocks, an essential way is to combine the environmental-behavioral psychology with landscape space research, and analyze the impacts of the environment on individuals through individual perception and their responses to the environment. Based on the theory of environment-behavior relationship, this paper studies the effects of environment on the behavioral stimulus, behavioral restrictions and social distance of pedestrians in Taikoo Li commercial district of Chengdu. Through analyzing the relationship between behaviors and the mental status of users and the environment of outdoor landscape spaces, we can provide a new perspective for the study of outdoor landscape space in commercial blocks.

2. Overview of the Taikoo Li Commercial Block

Chengdu Taikoo Li Commercial District is north to Daci Temple Road, south to the East Street, west to the Shamao Street and east to the South Street and Bitie Street of the Dongshun City. It is next to the Chunxi Road Business Circle. The plot is concave around Daci Temple. It is narrow from east to west, and relatively wide in the south. It covers an area of 70800 m^2. It is a commercial and cultural landmark with both religion and folk cultures in the center of Chengdu, and a model of urban commercial space.

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3. Research Contents and Research Methods

Spatial nodes in the outdoor landscape of Taikoo Li stimulate pedestrian behaviors. According to the theory of environmental stimulus, the interior nodes of Taikoo Li were scored by questionnaires. The degrees of environmental stimulus were from 1.0 to 7.0. Less than 3.0 points represent lack of stimulus; 3.0-5.0 points represent normal stimulus; 5.0-7.0 points represent overstimulation (5.0 points are the best stimulus). Ten pedestrians, who often walk in Taikoo Li, aged between 20 and 45 years old and with a male-to-female ratio of 1:1, were selected to score the selected nodes in fast and slow areas. The average score of each node was used to analyze the degree of environmental stimulation of the nodes.

Outdoor landscape environment of commercial blocks can restrict the behaviors of pedestrians. According to Avery's behavior restriction theory, in Taikoo Li commercial block, the main factor which restricts the behaviors of pedestrians is the weather. Four days with representative weather types were selected, included one cloudy day (August 27, 2016), one sunny day (August 19, 2016), one hot day (July 15, 2016), and one rainy day (August 21, 2016). The influence of weather on pedestrians' behavioral restriction is analyzed, and the control types of pedestrians' behavioral restriction are analyzed.

Behavior characteristics of pedestrians in different backgrounds are also analyzed. According to Buck's non-individual behavior model, three main squares (the East Square, the Daci Square and the West Square) in Taikoo Li block were selected as backgrounds to analyze the behavior characteristics of pedestrians in different backgrounds.

Last issue of this paper is the influence of outdoor landscape space of the commercial block on pedestrians' social distances. According to Jan Gehl's air bubble theory and Hall's personal space theory, two squares with more people gathering were selected to collect the distribution of people flow in a fixed period of time, and to observe the interpersonal distances, so as to analyze the characteristics of pedestrians' activities and the intensity of communication.

4. Research Results and Analysis

4.1 The environment stimulation and recreational individual behavior

Environmental stimulus is an external environmental factor that can cause people's emotional, psychological and behavioral changes. In the long-term interaction with the space environment, human beings have formed many behavioral and psychological characteristics adapted to the space environment. [4] Paul Bell believes that too much environmental stimulus has a negative impact on behavior and mood, while inadequate stimulus can also produce unsatisfactory results. [2]

From Table 1, we can see that among the 10 nodes in Taikoo Li slow area, except node S3 which has the score less than 3.0 and belongs to the group of inadequate environmental stimulation, the scores of all other nodes are between 3.0 and 4.6, and belong to the normal stimulation level. It shows that the spatial environment of landscape nodes in the slow zone can provide suitable stimulation and gather the people flow better. In the fast area, there are four nodes with insufficient environmental stimulus, since their scores are less than 3.0. Six nodes with the score from 3.0 to 4.6 belong to the general stimulus level, indicating that there are more nodes lacking attractiveness in the fast zone. These nodes have design defects, which affect people's recreational behavior to a certain extent. Based on the spatial characteristics of nodes and the observation of individuals' behaviors, it is found that most of the nodes with insufficient stimulus are located in the longer area of the street. The architectural style on both sides is repetitive and simple; pedestrians often feel slightly bored. However, some of the nodes with the attractiveness of landscape facilities in the longer area have fewer pedestrians due to the problem of walking route guidance. Pedestrians do not stay too much in the space with insufficient stimulation. They usually have a single behavior during the stay and have less interaction with the environment. They often choose to leave the space quickly to find more attractive nodes(Figure 1, Figure 2).

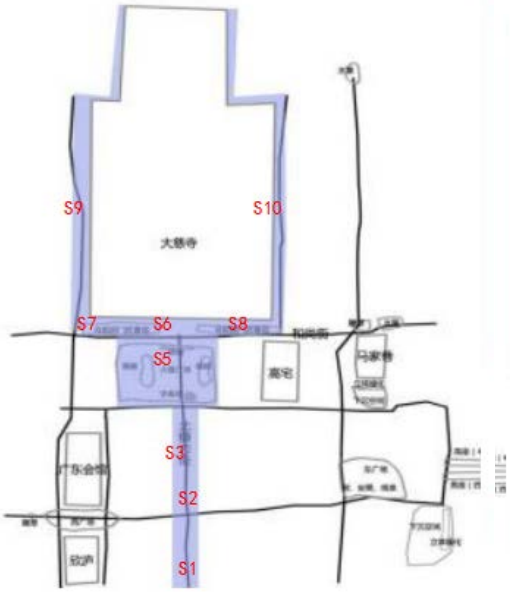

Figure 1. Stimulus Nodes in Slow Area

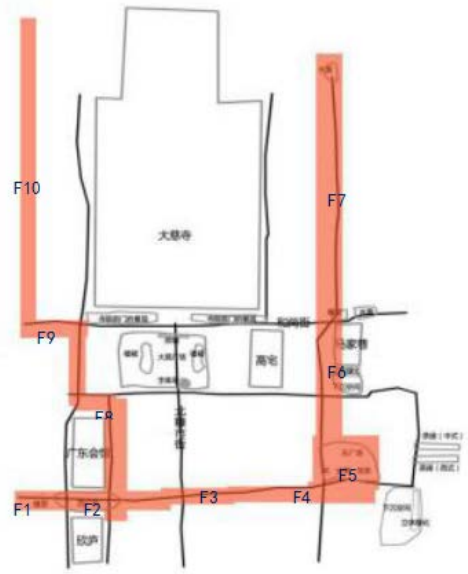

Figure 2 Stimulus Nodes in Fast Area

Table1. The scores of selected nodes in the slow area and the fast area

Score	Node									
	1	2	3	4	5	6	7	8	9	10
Mean of the slow area ± standard error	3.0 ± 0.6	3.3 ± 0.4	2.3 ± 0.4	4.3 ± 0.6	4.5 ± 0.7	4.6 ± 0.5	3.3 ± 0.6	3.3 ± 0.4	3.2 ± 0.6	4.6 ± 0.5
Mean of the quick area ± standard error	3.0 ± 0.7	4.0 ± 0.7	2.1 ± 0.7	4.2 ± 0.8	4.9 ± 0.7	4.6 ± 0.5	1.9 ± 0.3	3.4 ± 0.7	2.7 ± 0.7	1.7 ± 0.7

4.2 Environmental behavior and group space activities in Taikoo Li

4.2.1 Behavior restriction of Taikoo Li environment on pedestrians and pedestrians' responses to behavior control

Behavior restrictions, also known as control models, refer to the loss of people's sense of control over the environment because some phenomena in the environment restrict people's behaviors. Avery divides people's control over environmental restrictions into three categories: behavioral control, cognitive control and decision control. Through fixed-point observation (Table 2), it is found that most pedestrians choose to walk in corridor spaces and shadows covered by buildings in hot and rainy days. This shows that these two kinds of weather restrict the recreational routes of pedestrians in the district, and the pedestrians' response to that behavior restriction belongs to decision-making control: they use their behaviors to avoid or reduce environmental restrictions. In cloudy and sunny days, pedestrians' behavioral restrictions are relatively low. Cool weather and mild sunshine stimulate pedestrians to carry out more outdoor activities. Activity restrictions become weak and recreational routes are random. Pedestrians' environmental behavioral restrictions are embodied in cognitive control.

Table 2. The pedestrians' activities in four kinds of weather in Taikoo Li

classify	People flow	Activity Area	activities	Behavior restriction features	Type of Control
Cloudy days	more	Main street lane, second floor corridor area, tea house on the edge of the street	Walk,party, chat, watch the fountain, drink tea	Cool and appropriate weather has a low degree of restraint on pedestrians' behaviors	cognitive control
Sunny days	more	Main street lane, second floor corridor area, tea house on the edge of the street	Walk, party, chat, take pictures, watch the fountain, drink tea	Sunny weather attracts people to have more outdoor interactions and activities with less behavioral constraints	cognitive control
Hot days	less	Grey space under the corridor and shaded area of the building	Walk	Due to the hot weather, pedestrians are more likely to walk in the grey space under the corridor or in the shadow area covered by the building. They are reluctant to enter the main street without shades or the corridor area on the second floor. The weather has a high degree of behavioral constraint.	behavioralcontrol, decision control
Rainy days	Mode-rate	The grey space under the corridor and the edge area of the square	Walk, chat, and watch the fountain	In rainy days, pedestrians are restrained to walk in the main street with umbrella. Walkers without umbrellas tend to walk in the gray space under the second floor corridor. For pedestrians, the degree of behavioral constraint is within the acceptable range	cognitive control, decision control

4.2.2 Behavioral background of Taikoo Li and background personnel

Buck's non-individual behavior model regards the behavior background as an independent entity which has a specific physical structure. Standard behavior model represents the common behavior characteristics of the group. It is interdependent with the physical environment and can reflect different cultural purposes. [1] Different backgrounds produce different behaviors; an effective behavior background has relative background personnel. Through the analysis of the background personnel, we can summarize the general law of the common behavior characteristics of the group under this background.

Taking three main squares (the East Square, the Daci Square and the West Square) in Taikoo Li block as background, this paper analyses the behavior characteristics of pedestrians in different backgrounds (Table 3). It is found that although the three squares are located in Taikoo Li block, their behavior backgrounds are different due to their different geographical locations and landscape facilities. In the same period, there are always more women than men in the three squares, which show that shopping blocks are mainly dominated by women's activities. Among women, young

girls are the majority, reflecting that the style of the whole block is modern and fashionable, which is in line with the concept of youth. The West Square, as the entrance square of the block, allows pedestrians to have background behaviors such as watching scenery, consulting information, talking and communicating. The music fountain in the East Square promotes pedestrians to listen to music and appreciate the fountains. In the Daci Temple Square, due to the existence of Buddhist temples, screen walls and the Ziku Tower, people are engaging in activities of enjoying historical sites and entering the Buddhist temples, which are different from activities in the East and West Squares. According to the analysis of the behavioral background, it can be found that middle-aged and elderly people are more likely to move near historical sites and the Buddhist temple cultural areas; young people and children prefer to stay near the fountains and dynamic sculptures.

Table 3. Conduct background research in west, east and Daci squares

Name	West Square	Daci Square	East Square
Background personnel	Tourists, pedestrians	Tourists, pedestrians, pilgrims	Tourists, pedestrians
personnel composition	Male : female=1:4 Age level: infants, children and young people are in the majority, while middle-aged and old people are in the minority.	Male : female =2:7 Age level: the proportions of young people, middle-aged people and elderly people are average; children are not commonly seen.	Male : female =1:3 Age level: children and young people are the majority, middle-aged and old people are the minority.
Background behaviors	Photographing with sculptures, stopping to look up billboards, shopping in stores, social activities, walking	Stopping to appreciate and take photograph with screen walls and the Ziku Tower, resting under the tree array, entering Daci Temple for Buddhist activities, social activities, taking walks	Watching and listening to music fountains, taking pictures under trees, social activities, shopping in stores, taking walks

4.3 Interpersonal distance and outdoor activities

Jan Gail divides outdoor activities into necessary activities, spontaneous activities and social activities. [3] Necessary activities occur under various conditions; spontaneous activities only occur under suitable outdoor conditions; social activities are passive contacts that depend on the participation of others. Some of these activities only need one person to complete, while others need several participants to cooperate. But whether alone or with others, there is a personal space around each individual. When social activities are carried out, these personal spaces intersect with each other; the communication distances change. That is the air bubble theory, that is, the closer the relationship is, the smaller the bubble is; and vice versa. Hall's personal space theory divides personal space distance into intimate distance, personal distance, social distance and public distance. [2] The West Square and the Daci Square have a lot of people; pedestrians at these two places tend to maintain appropriate social distance or public distance. Their relationship is not very close; the activities are mainly spontaneous social activities. There are also quite a number of people who carry out social interaction activities with relatively small interpersonal distances, which are reflected in the appropriate intimate distance and personal distance.

5. Conclusion

The outdoor space environment of Taikoo Li commercial block is closely related to human

behavior. Through the analysis of pedestrian behavior in the commercial block, it is found that most of the landscape nodes in Taikoo Li block have better environmental stimulation and can attract pedestrians to participate in outdoor activities to the greatest extent. When the behaviors of pedestrians are restrained in hot and rainy days, pedestrians have alternative recreational routes. For instance, they can walk in the corridor space or shadows covered by buildings. Different people have different behavioral needs; middle-aged people, the elderly, the young people and children have their own adaptive behavioral background areas. Most of the outdoor activities engaged by citizens are spontaneous social activities, which reflect the multi-functional and inclusive vitality and charm of the outdoor activities space environment. Thus, Taikoo Li commercial block can provide excellent business and leisure environment.

Acknowledgement

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