

Study on the relationship between the restorative effect of urban green space and personal environmental preference ——A case study of the Longtan park in Taiyuan

Xia Zhihao

School of civil engineering and architecture Wuhan University of Technology, Wuhan, Hubei Province, China

Abstract. To improve the design strategy of urban green space and enhance the restorative effect of urban green space, this study took the Longtan Park in Taiyuan city as an example to test the relationship between the restorative effect and personal environmental preference based on eight perceived sensory dimensions in green space and restoration environment scale-Chinese version. The survey was conducted by questionnaire and interview. The results show that there is a positive correlation between the restorative effect of environment and personal environmental preference, while personal environmental preference is related to age characteristics. Children prefer rich in species and nature. The young prefer serene and refuge. Middle-aged people prefer nature and serene. Elderly people prefer social and prospect.

1 Introduction

The aggravation of the urbanization process has brought a series of social problems, such as rising pressure of residents, environmental degradation[1]. As a scarce landscape resource, urban green space is of great significance to the physical and mental health of citizens. This kind of environment with the restorative function of renewing and restoring the increasingly consumed spiritual and physical resources of human beings is called "restorative environment"[2]. To explore the relationship between the restorative effect of urban green space and residents' environmental preferences will help to improve the restorative effect of green space and improve the quality of lives of urban residents.

In addition to natural and aesthetic elements, urban green space also includes public activity areas, playgrounds, outdoor sports facilities, promenades and natural landscape protection areas[3]. The Swedish Agricultural University research team believes that urban green space can be divided into eight perceived sensory dimensions by different environmental characteristics: serene, nature, rich in species, space, prospect, refuge, social and culture[4-6].

This study took the Longtan Park in Taiyuan city as an example and investigated 100 visitors of different ages and genders to explore the relationship between the restorative effect of urban green space and personal environmental preference, as well as the relationship between environmental preference and ages.

2 Materials and Methods

2.1. Objectives

The Longtan Park is located at No. 28, Chengfang street, Taiyuan city. Located in the central area of the city, it is a large-scale comprehensive park integrating natural landscape, public leisure and social culture.

The main reasons for choosing this park as the research object are as follows:

- The park has a large area, convenient traffic conditions and massive visitors, which is convenient for the research.
- The park integrates the history, culture, ecology and leisure into the landscape design. There are ecological landscape including "oasis landscape" and "Qifeng Lake". There are leisure venues including outdoor fitness, table tennis, and badminton hall. Besides, there are lots of cultural relics and historic sites including the Spring and Autumn Tripod. Landscape types are diverse, and eight perceived sensory dimensions are complete.

In order to make the data collection cover the main landscape nodes and populations of the whole park so that it can be more representative, 8 typical landscape units were selected, and the site photos were taken and classified according to perceived sensory dimensions, as shown in figure 1.

Corresponding author: 2572391238@qq.com

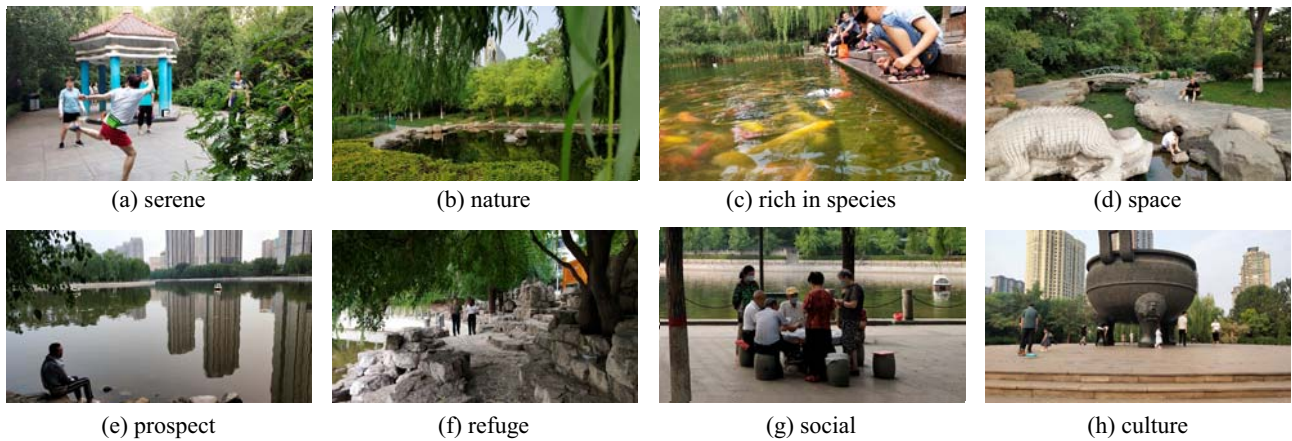


Fig. 1. Eight landscape units with different perceived sensory dimensions in the Longtan Park

2.2. Research method

2.2.1. Visitors proportion and distribution information.
 The proportion and distribution of visitors were observed by pedestrian counting and tracking observation method. The observed data were taken as the average of two days' dates. The observation time was 7:00-10:00 a.m. and 15:00-20:00 p.m. on June 19, 2020 (Friday) and 6.20, 2020 (Saturday). The weather was clear and the temperature was 18-33 °C. The degree of air pollution was excellent or mild.

2.2.2. Restorative effect and environmental preference.

The survey was conducted mainly by questionnaire. The questionnaire mainly included the following three parts: personal information (including gender and age), environmental preference, and restorative effect evaluation of 8 landscape units.

The restorative effect evaluation of the environment was based on the "Restoration Environment Scale-Chinese version" by scholars Ye Lihong, Zhang Fan and Wu Jianping. The scale is evaluated from four dimensions: away, extent, fascination and compatibility[7]. In order to reduce the difficulty of evaluation, the scoring questions were changed into sorting questions.

For the elderly, interviews were taken, and then the investigators filled in the information on their behalf. Children didn't participate in the survey, but their parents filled out the questionnaire on their behalf. The survey time was the same period of June 21 (Sunday) and 6.22 (Monday), 2020. The external environmental factors were the same as the above.

In the preliminary observation, the actual demand of the elderly and children for green space was more, so it is emphasized in the survey. Within 2 days, 106 questionnaires were sent out and all of them were collected. Among them, 4 copies didn't have complete valid information and 2 copies were contradictory. Therefore, there were 100 valid questionnaires, including 30 for children, 30 for the elderly, 20 for the young and 20 for the middle-aged.

3 Results & Discussion

The effective data were numbered and imported into Excel for descriptive statistical analysis. The respondents ranked the eight types of landscape units according to their personal conditions, and then converted the ranking information into preference scores. Ranking "8" gave a score of 1, indicating the highest degree of preference. By analogy, ranking "8" gave a score of 1, indicating the lowest preference. Then the degree of affection and restorative effect of the environment could be obtained. Different visitors were divided into 4 groups by the age level: children (aged 0-15), the young (aged 15-30), the middle-aged (30-60), and the elderly (over 60).

3.1. Visitors proportion.

The survey shows that the visitors are mainly the elderly and the middle-aged in the park, accounting for 70%. However, further research shows that although the number of middle-aged people is the highest, most of them come here to accompany the elderly and children, and the actual personal demand of this group is relatively low. If the visitors are divided according to the actual demand proportion of each age group, the data in figure 2 can be obtained.

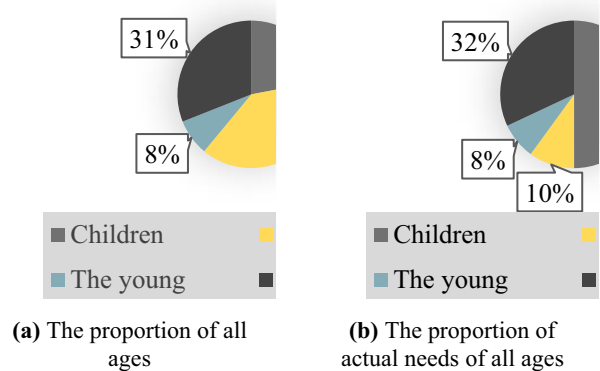


Fig. 2. The proportion of visitors

3.2. Distribution information.

Children's main activities included learning (writing calligraphy, practicing Taiji), playing, getting close to nature (feeding fish, playing water, rowing). Therefore, they were mostly concentrated in the middle and south of the site where species were rich and space was wide, as shown in figure 3.

The main activities of middle-aged people included accompanying the elderly and children, singing, dancing and taking selfies. Therefore, the distribution area of middle-aged people was roughly the same as that of children.

The main activities of the elderly included fishing, chatting, singing, dancing, writing calligraphy, walking, fitness and meditation. The location distribution of the elderly showed a "small communities" pattern, and the overall distribution was relatively uniform.

Young people's favourite activities included fishing, chatting, dating, distributing leaflets for research and so on. The location distribution of the young was very scattered, and was significantly distributed along the lake. The liquidity was strong.

Through observation, we found that the distribution of different age groups was different. Environmental preference is related to age characteristics.

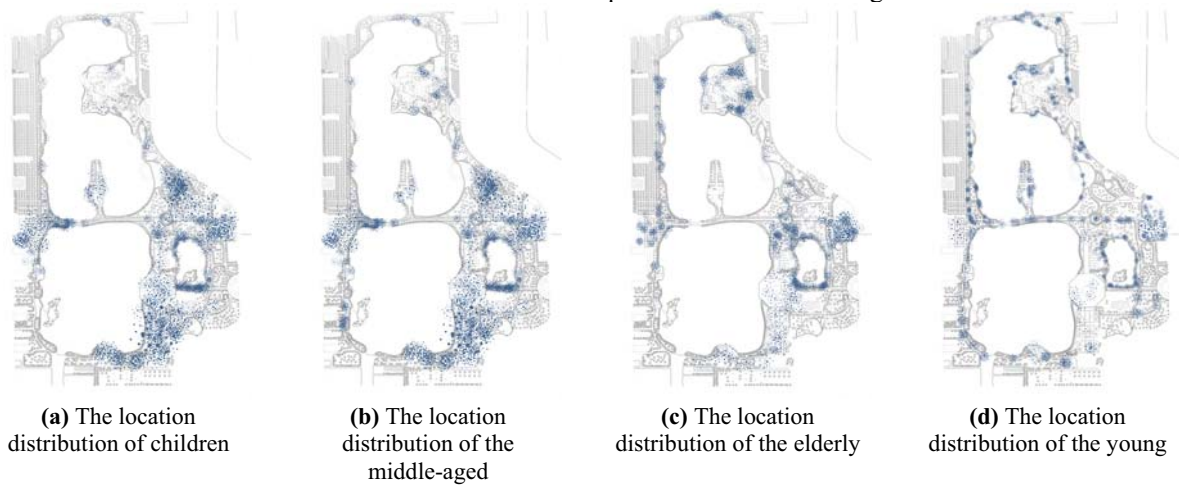


Fig. 3. The location distribution of visitors

3.3. Personal environmental preference and age characteristics.

Questions related to this part included: my favourite landscape units [sorting question], my age group [single choice question], my gender [single choice question].

According to the statistical results, people with different age had different environmental preference for 8 landscape units with different perceived sensory

dimensions, as shown in figure 4. The variance of the average preference score was between 0 and 6, indicating that the individual difference was not much different from the average value. Specifically, the environmental preference of different age groups are as follows:

- Children: rich in species and nature.
- The young: serene and refuge.
- The middle-aged: nature and serene.
- The elderly: social and prospect.

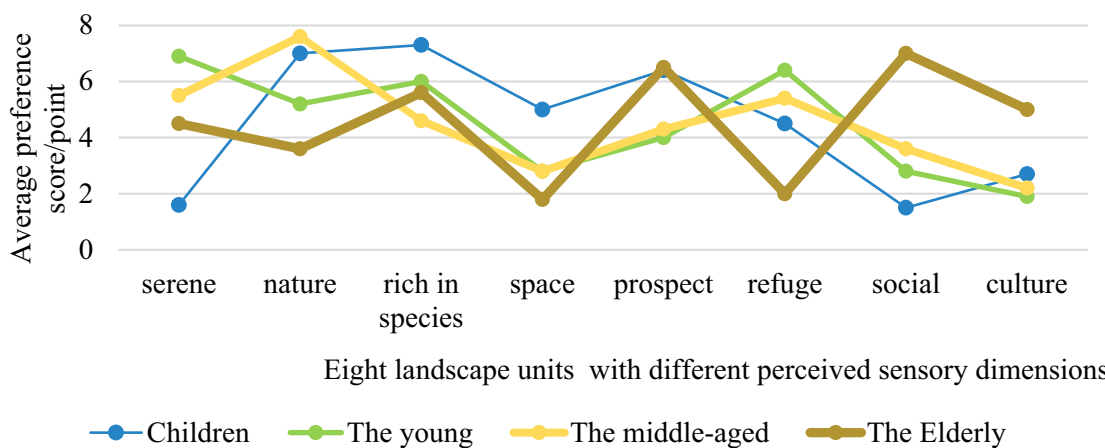


Fig. 4. The relationship between environmental preference and age characteristics

According to the observation, this result may be caused by the activities preferred by the crowd. Children are more active and need dynamic space. Young people like to chat

and meet, so they need more serene or sheltered space. The old people tend to stay longer, with more obvious sociality

and aggregation, and need more broad space for leisure and gathering.

3.4. The restorative effect and personal environmental preference

Questions related to this part included: I like here most [sorting questions] and 22 questions of restoration environment scale-Chinese version [sorting questions].

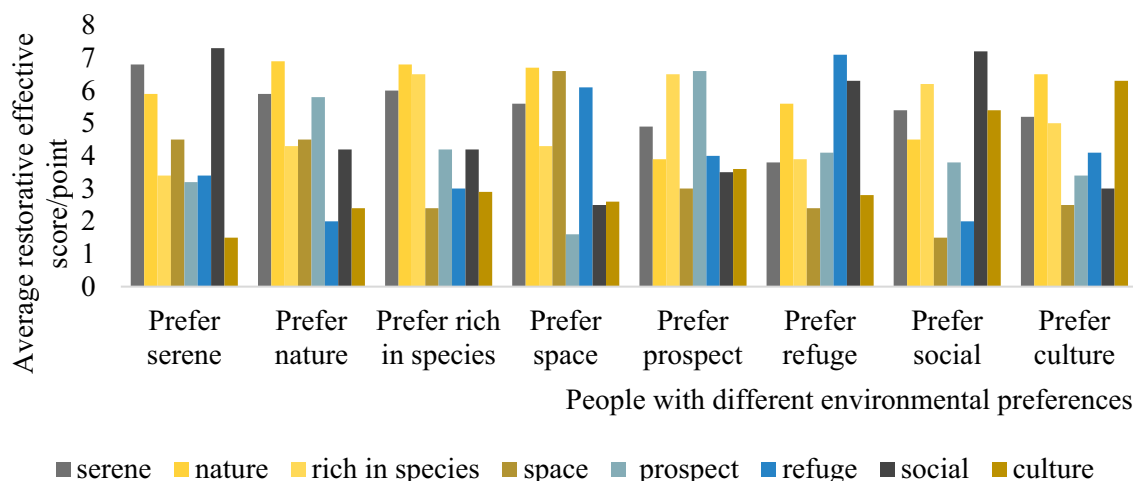


Fig. 5. The relationship between the restorative effect and personal environmental preference

4 Conclusions

Through the above analysis, we can draw the following conclusions:

Firstly, personal environmental preference is related to age characteristics. Children are fond of rich in species and nature more. The young people prefer serene and refuge. The middle-aged people prefer nature and serene. The elderly prefer social and prospect.

Secondly, there is a positive correlation between the restorative effect of urban green space and personal environmental preference, but whether there is a causal relationship, and which causes need to be further studied and analysed. In addition, whether the environmental preference is related to population geography, income and other factors can be further studied.

In Chinese scholar song Rui's paper "Construction of Restorative Environment Based on Eight Perceived Sensory Dimensions in Green Space—A Case Study of the People's Park in Baoji", it is proposed that[6]:

"For people with different stress levels, we can combine the nature, rich in species, serene and refuge green space in the design, and try to avoid the social, cultural green space, so as to create an environment that is easier to relieve pressure and conducive to physical and mental health."

The conclusion of this survey can be used as a supplement and extension of the above conclusion, that is, the selection of urban green space should not be generalized, but adapted to local conditions. In the design of urban green space with restorative function, the characteristics of the population should be fully considered. Before the design, the project should be fully

Figure 5 was the evaluation of average restorative effective score made by people with different environmental preference. The variance of it was between 0-8, indicating that the individual difference was little different from the average value.

It was found that there was a strong positive correlation between the environmental restorative effect and personal environmental preference. For example, people who prefer rich in species green space think that rich in species or nature green space has better restorative effect.

positioned, and the age characteristics and environmental preferences of the surrounding residents should be counted. Design urban green space according to local conditions and different people. Let people of different classes, ages and genders find their home in the design.

References

- Nielsen, T.S., Hansen, K.B. (2007) Do green areas affect health? results from a danish survey on the use of green areas and health indicators. *Health & Place*, 13(4): 839-850.
- Zhao, H., Wu, J.P. (2010). Review on Restorative Environment: The Theories and Evaluation. *Chinese Journal of health psychology*, 18 (1): 117-121.
- Kaplan, R., Kaplan, S. (1989) *The experience of nature: A psychological perspective*. New York: Cambridge University Press.
- Schreyer, R., Lime, D.W. (1984) A novice isn't necessarily a novice: The influence of experience use history on subjective perceptions of recreation participation. *Leisure Sciences*, 6(2): 131-149.
- Memari, S., Pazhouhanfar, M., Nourtaghani, A. (2017) Relationship between perceived sensory dimensions and stress restoration in care settings. *Urban Forestry & Urban Greening*.
- Song, R., Niu, Q.C., Zhu, L., Gao, T., Qiu, L. (2018) Construction of Restorative Environment Based on Eight Perceived Sensory Dimensions in Green Space—A Case Study of the People's Park in Baoji. *Chinese Landscape Architecture (A01)*, 110-114

7. Ye, L.H., Zhang, F., Wu, J.P. (2010) Developing the Restoration Environment Scale. *China Journal of Health Psychology*, 18 (012): 1515-1518