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# Visual preferences of small urban parks based on spatial configuration of place

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***Abstract***

*The importance of small urban parks (SUP) in mega cities has been accepted as an essential component of urban lung and restorative settings. As urban population in the world increases and the cost of maintaining large parks escalates, urban authorities are shifting their attention to creating and maintaining smaller urban parks. However, SUP may present a different ambience due to their location, size and visual appearence. In this regard, visual preference which is associated with spatial configuration and content of space, plays a vital role. This research examined 394 respondents' visual preferences related to 16 SUP located in the city of Tabriz, Iran. It employed a quantitative photo survey method, based on Kaplan and Kaplan's information-processing and Appleton's prospect-refuge theories as preselected variables by expert panels. Results indicated that mystery, as an indicator of having winding shapes of paths and expansive body of trees, was the most preferred spatial configuration of space, followed by coherence, refuge and complexity. Legibility and prospect as indicators of wide perspective and sky lines with clear focal points were the least preferred constructs. The results provide information on preferred visual configurations for SUP that may assist urban designers and landscape architects to improve their design of these specific green areas for the public.*

**Keywords:** *Small urban parks, Visual preferences, Information-processing theory, Prospect- refuge.*

## 1. Introduction

Nowadays, due to the densification of cities which has led to unplanned urban development [1] and lack of access to peripheral greenery spaces [2], small green areas such as small urban parks (SUP) have received an increased attention from researchers [3,4,5]. The modern concept of SUP was created to provide recreational spaces closer to the population of cities [6]. Matsuoka and Kaplan reviewed different variables, which could define human needs in the urban natural landscapes [7]. They identified contact with nature, aesthetic preferences (or attractiveness), as well as places for recreation, play, privacy, and citizen participations as the main factors that can determine the success of SUP. SUP contribute to mental restoration [8], improve health and well being [9], enhance social interactions [10], are used for socialising, rest and restitution [5], and offer a certain range of active and passive recreational activities [11]. SUP, according to Chapman [12], are located in the center of development and can be accessed without travelling too far. In terms of size, a tenth of an acre (.04 hectare) to 5- 6 acres have been accepted as the total size of these spaces [13]. This range of sizes includes neighbourhood parks and pocket parks which are called "*Boostan*" in Iran [14].

### *1.1. Importance of design in SUP*

In recent times, designing public parks have captured the attention of landscape designers and architects [15]. A good design, as an essential ingredient of urban parks, is regarded as an important factor, which can influence the success of the park [16]. Design has been stressed as an important variable, which could affect park use [17]. Design attributes, which affect the spatial quality and its configuration of space, influence public preferences and need to be considered by landscape architects in their design [18]. However, the information related to the design of SUP is not sufficient [13,4,19]. In terms of design, in order to assess landscape visual quality, the importance of human–based perception has been suggested [20]. For a successful assessment, it is acceptable to look at the users' preference rating to provide a frame in the design approach [21]. Lavie and Tractinsky [22] suggested that an aesthetic criterion could be a part of an effective integrated design. Thus, looking for public preferences through vision could help in achieving design requirments (Fig. 1).

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**Fig. 1** Initial Step of Current Study

## 2. Litrature Review

Vision, as the central component of human perception of the surroundings, helps humans to understand the world by triggering information, which is stored in the form of memories [23]. Mumcu, Düzenli, and Özbilen [24] proposed that knowledge about visual features, and its relationship with human beings, provide a possibility for more activities and affect users' preferences of a setting. Users' aesthetic judgment mainly depends on the visual aspects of the landscape [25]. In this sense, there is a direct relationship between the assessment of the aesthetic dimension of the environment and visual perception [26]. In fact, visual assessment in terms of aesthetic quality, is a product of particular visible features and their interaction with an applicable psychological aspect of the observer's mind toward the environment [27].

### *2.1. Applicable theories*

According to Rapoport [28], people's evaluation of the environment is based on an overall affective response. Kaplan [29] argued that this evaluation can be measured by applying the visual preference rating. Preference is a result of perceptions that originate from acquired knowledge, innate interaction, and cognitive processing [30]. Visual preference is defined as an observer's degree of like or dislike in terms of visual factors of a place or space [31]. In fact, in the field of landscape, study of preferences, has been considered as a reliable measurement [32]. Most theories relating to landscape aesthetic studies fall into two main groups known as the ecological and psychological explanations of the environment [31]. The ecological group of theories include Habitat theory, Prospect and Refuge theory as well as ecological perspective. The psychological group of theories, which provide the psychological explanations of the environment, includes the Neuropsychological perspective and Arousal theories. Of these second group of theories, Appleton's prospect and refuge and Kaplan's information processing theories have been widely applied in landscape visual assessments [24,31,33].

Appleton's prospect and refuge theory postulates that preference in landscape is basically related to an environment which supports life. Researchers have used Appleton's prospect and refuge theory in explaining different landscape phenomena such as enclosure and visibility [34], perceived danger [35], aesthetic response and attractiveness in the environment [36], as well as landscape preferences [37, 38]. The need for shelter and the ability to keep close watch over their surroundings are primitive human needs that have been used as the main explanation for human preference for landscape. In fact, looking for an opportunity, which can achieve a sense of sight and concealment can lead to this motivation. It is noted that prospect can be a vital factor for determining landscape preference [24,36,39]. However, there has been varied evidence in support of refuge as an important factor in determining landscape preference. Some studies support this variable [37] while others show opposite results [36].

According to the information processing theory, information which is received from the environment can be categorized into inferred and immediate levels. The information processing theory has been applied in numerous preference studies [40], architecture studies [41], preference and landscape aesthetics [31], urban preferences [42], and even in computer science studies [43]. Four variables in this matrix are proposed as predictors of landscape preference [33,44,45]. These are Coherence, Legibility, Complexity and Mystery. Mystery and complexity are the main factors dealing with information gathering while coherence and legibility deal with understanding of spaces. The spatial configuration and arrangement of spaces provide information, which leads to humans' understanding and their exploration of their environment. Most studies confirmed the applicability of information processing theory in landscape assessment [33,38]. However, some studies found negative relationships between preference and informational characteristics [45]. Arthur [33] states that this theory is the most extensively tested of the psychological theories about landscape preference. R. Kaplan and Kaplan [46] suggested that the theory must be evaluated in different contexts to understand its applicability in different cultures and the role of familiarity in influencing preferences.

Both theories have been applied in numerous studies [e.g. 24,33], most of which are related to forested, rural, and big parks in urban areas [e.g. 16,42]. Nevetheless, these theories have not been widely used in research on SUP. Therefore, examination of extracted variables could help to understand the most and the least preferred spatial configuration of these spaces.

## 3. Aims of the Study

Population and densification tendencies are increasing in Iran metropoles such as Tabriz [47]. Tabriz muncipality aims to establish more SUP in the city. The aim of this study is to determine public visual preferences based on spatial configuration and content of SUP. Thus, the current study addresses the following research question: what are the public visual preferences (spatial configuration and content) for SUP?

## 4. Methodology

Quantitative research approach, which refers to systematic empirical investigation of social phenomena through statistical computation techniques was selected for the current study. Based on the preference approach with the application of likert scale, the researchers conducted a photo survey inquiry on site, which has a non-experimental design. It was carried out in order to use the related variables extracted from Appleton's prospect and refuge theory and information processing theory for discovering the most and least public visual preferences in SUP in Tabriz, Iran. It should be mentioned that this survey was a part of research on interaction among all senses.

### *4.1. Tabriz*

Tabriz is a city in Iran with a population of about 2,000,000. It is assumed to be a homogenous community as it consists of people with similar culture and language. Tabriz, as the capital of East Azerbaijan Province, has 10 districts and is located in the northwest of Iran. It is the fourth largest and one of the most historical cities in Iran. Small urban parks cover 65-75 percent of the total number of the available parks in this city (Table 1).

### *4.2. Sampling Design*

In this study, a geographical cluster sampling approach was applied. In this sampling method, homogeneous grouping works as evidence in order to shape a strong statistical population. Tabriz SUP were divided into two categories based on their location (Historical and Modern areas). The criteria for selecting the SUP in the current study included urban parks with radius between 200 and 600 m2 [14], areas less than 2 hectars [13], areas close to neighborhoods, and areas that contain special features such as vegetation, sitting area, water features, playground [48], and exercise equipment. Based on the mentioned criteria, from 135 SUP a total of 34 were selected from the modern part and 15 from the historical part of Tabriz. According to Mitra and Lankford [49], a minimum of 10% of the total elements should be enough for data collection procedures. However, to increase the accuracy of the results, around 30% of the total number of acceptable parks for each cluster were chosen (11 for the modern part and 5 for historical part of Tabriz). Fig. 2, shows the location of selected SUP via simple random selection.

**Table 1** Parks in Tabriz

| Type | | Number | |
|---|---|---|---|
| Small Parks | Pocket parks | 63 | 135 |
| | Neighborhood parks | 72 | |
| Inter Zonal Parks | | 34 | |
| District-Bound Parks | | 8 | |
| City-Bound Parks | | 4 | |
| Total | | 181 | |

Source: Tabriz Green Space and Park Organiation Report, 2011

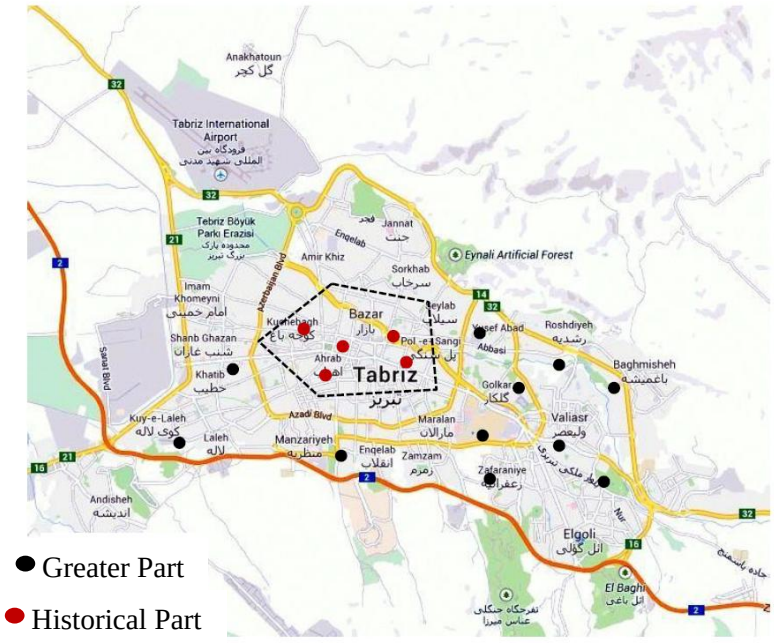



**Fig. 2** The Location of Selected Small Urban Parks in Tabriz
Source: Goggle Map, 2014

*4.2.1. Sample size*

In order to determine the appropriate sample size, the daily number of visitors for each selected SUP was recorded. This was archieved by asking the park keepers and using direct observation throughout weekdays and weekends between August 2-28, 2012. Assuming a normal distribution, the minimum sample size required was n = 394 (Table 2), based on In [50] distribution formula.

**Table 2** The Daily Number of Visitors to the Selected SUP

| **Greater Tabriz's Parks** | | |
|---|---|---|
| Park's name | Average Daily visitors (Weekdays and weekend) | Respondents |
| Maghbare AL.Shoara | 950-1000 | 53 |
| Koche bagh | 350-375 | 20 |
| Khaghani | 800-850 | 45 |
| Ghatran | 50-100 | 5 |
| Banovan | 175-200 | 10 |
| | Total:2325-2525 | Total: 133 |
| **Old Parks** | | |
| Park's name | Average Daily visitors (Weekdays and weekend) | Respondents |
| Vali asr (Ghadim) | 700-750 | 40 |
| Misagh (Baghmisheh) | 800-850 | 45 |
| Yas | 330-375 | 19 |
| Rajaei shahr (Zafarnnieh) | 350-400 | 21 |
| Resalat (Farhangian) | 250-300 | 16 |
| Mir Damad (Abasaleh) | 350-400 | 21 |
| Fadak | 350-400 | 21 |
| Sosangerd (Yaghchian) | 250-300 | 15 |
| Laleh (Roshdieh) | 250-300 | 15 |
| Nilofar | 500-550 | 28 |
| Manzarieh | 350-375 | 20 |
| | Total:4480-5000 | Total: 261 |
| | Total:6805-7525 | Total: 394 |

*4.3 Photo selection procedure*

The survey relies on a visual preference rating, which is image dependent and intuitive. In this research photographs were used as surrogates, which represented an environment or scene. Possibility to simultaneously compare several scenes [51], and economical benefits [46] could be logical reasons for the wide use of photographs. It has been indicated that the employment of photographs is a valid surrogate for the real environment if the photos are appropriately sampled as representatives of the scene they represent [52]. Daniel and Meitner [53] reported high levels of consistency between responses that originate from experiencing the representative landscape and parallel responses when expressing a preference and/or perception judgment based on photographs. Also, it has been shown that photographs pose no problems particularly in the preference ratings [54]. To enhance the validity of the photographs, certain conditions were considered: capturing remained consistent (height of 175 cm for all pictures); the variability of content (which was not a part of the research) was controlled; technical quality of the photographs was controlled (photos were taken between 10 a.m. and 2 p.m.); and the participants were advised about their evaluation (e.g., they were told to look at the environment not the experience of a particular space).

A sampling selection technique was used based on the availability of a wide range of stimuli describing the psychological variables investigated in the current research. Based on the research cluster (49 parks) over 800 photographs of Tabriz SUP during July 2012 (summer time) were taken by using a canon digital camera (14 mega pixels, 5x optical zoom lens). All the photographs were taken from the public access walkway to ensure that the scenes were representative of whatever people could easily see. Subsequently, to reduce bias, by using Adobe Photoshop CS5 version 12 software, some of the content, such as people, vehicles and outdoor buildings in the photographs, was removed. Following the stratification process, which is used to ensure that an adequate number of scenes is available as repreventative of each category, the number of photographs were reduced to 180. At this stage, a panel of experts was invited for professional advice. Arthur [33] in a meta-analysis reported that rating scenes based on one or more semantic differential categories such as preference or information theory variables could be a typical protocol. In this protocol, judgment or stratified judgment sample could lead to a strong result. Panels with a minimum of three or four experts would be appropriate to rate the semantic differential variables [33]. However, it is recommended to

include more experts on the panel to achieve an accurate result. In order to aid the researchers in the decision making process for photo selection, 9 experts with at least 7 years of related experience (including 5 Architects, 1 Urban Designer, and 3 Landscape Architects) were requested to select the scenes. Each expert individually was asked to select 8 photographs that best represented the scenes for each category based on the given definitions in Table 3. The frequency of the most selected scenes by experts for each category was recorded. In each category 8 best representative scenes, which occurred at least 5 times, were selected as representative of that particular category. The photographs selected for more than one category were excluded.

**Table 3** Definition of Research Variables

| Variable | Definition |
|---|---|
| **Legibility** | -The scene is clear when I can go in. |
| | -In the scene it is easy to get around. |
| | -In the scene, it doesn't take much time to figure out a way of moving around. |
| | -In the scene I can always figure out where I am. |
| **Coherence** | - Component are well related to each other. |
| | -Components work well together. |
| | - Component seem to hang together. |
| | - Components help each other to provide better comprehension. |
| **Complexity** | -The scene has too many distractions, making it confusing. |
| | -The scene doesn't contain enough components to interest me. |
| | -The scene contains a good variety of components that keep me involved. |
| | -I feel drawn in by the variety of information or components the scene offers. |
| **Mystery** | -The scene makes me feel there is something interesting to explore. |
| | -As I navigate through the scene, more curiosity inspires me. |
| | -I expect that the scene will provide interesting thing to involve my curiosity as I explore around. |
| | -I feel I will find interesting things if I navigate more. |
| **Prospect** | -The scene has a wide and unimpeded view. |
| | -In the scene I could easily see what is going on around. |
| **Refuge** | -It offers opportunity for protection from other people's glances. |

Source: (Lee & Kozar, 2009; Mumcu et al., 2010; Ramanujam, 2007)

After scene selection, some conditions were followed. For example, a random number table was used for organizing the scenes on the booklet, and no more than two consecutive scenes from the same category were used on the same page, and no sequential scenes from the original order were presented on the same page. To reduce the bias, four photographs were added, two at the beginning to familiarize the participants with the rating procedures and two at the end of the booklet to show that the survey was about to end. As R. Kaplan and Kaplan [46] declare, no more than eight scenes would be appropriate to be pasted on each page of the survey booklet. For this reason, the scenes were presented in landscape oriented A4 booklets each of which contained four 3.5" x 5.2" color photographs. A total of 52 scenes were presented in the survey where the question "How much do you like each landscpe scene?" was followed by a 5 point Likert scale (1=Like, 2=somewhat like, 3=neither like nor dislike, 4=somewhat dislike, 5=dislike). Finally, to complete the data, the content of each category in the panel of seven experts was identified.

## 5. Data Collection and Analysis

After running a preliminary test, the actual survey was carried out from September 5, 2012 to October 20, 2012. The exclusion and inclusion criteria for selecting the respondents (visitors) in the actual survey included not having educational background in art (because the level of expertise could affect aesthetic preferences) [55], being above 18 years old (because children and adults have different demands for park visits) [56], and living around the surveyed park. Following a random sampling method, a daily survey was conducted on the visitors with a sampling interval of every 3rd visitor to each selected park.

SPSS (version 17) was used for data analysis procedures. Descriptive statistical methods, including mean, standard deviation, frequency, and percentage were used to analyze the data in order to determine the most and least frequently preferred categories based on public visual preferences. In fact, visual preference rating was listed simultaneously with data analysis.

Based on the reliability test results, the internal reliability of each domain (Mystery, Coherence, Refuge, Complexity, Legibility, Prospect of the questionnaire was good with Cronbach's Alpha of >.70. In this regard, according to Nunnally [57], value of >.50 would provide evidence for convergent validity; >.60 can be regarded as acceptable value and >.70 would be a good value.

## 6. Results and Discussions

The results revealed that among all the constructs the most preferred spatial configuration of the SUP was Mystery (*mean =1.72; sd=.65*). Both Coherence (*mean =*

*1.89, sd=.67*) and Refuge (*mean = 1.89, sd=.75*) together ranked the second highest overall mean scores, followed by Complexity (*mean= 2.14, sd=.84).* At the bottom, the second lowest overall mean score belonged to Legibility (*mean = 2.49, sd=.86*), while the least preferred spatial configuration was Prospect (*mean=2.51, sd=.86*).

In addition to the above-mentioned results, the predominant contents of each construct were identified. The mean rating scores of representative scenes and the content of each category are shown in Table 4.

**Table 4** Mean Description of Visual Preferences

| Items | Scenes' Predominant Contents | Mean* | SD | Cronbach's Alpha |
|---|---|---|---|---|
| **Mystery** | Tree shade, uncertain paths, Shrub, Height of trees, Green dominant color, Layered spaces, Irregular combination of natural component, Dense plant spaces | 1.72 | .65 | .75 |
| **Coherence** | Clear trails, Rows of trees, Grass, open spaces, Flowering, Integration between green spaces, Integration between manmade elements and greenery, Small amount of shade | 1.89 | .67 | .71 |
| **Refuge** | Tree shade, grass, Large amount of green space, closed environment | 1.89 | .75 | .78 |
| **Complexity** | Domination of manmade elements, Crossroads, Low shade, Various combinations of natural and manmade components, Accessibility to green surfaces; Availability of hard ground and pavements, Shape geometry differences | 2.14 | .84 | .81 |
| **Legibility** | Clear focal points, Open spaces, Pavement, Low amount of shade; Availability of simple or multiple orientations, Recognizable texture | 2.49 | .86 | .81 |
| **Prospect** | Sky line, Wide perspective, Arrangement of different components | 2.51 | .86 | .79 |

Note: * Rrating scale is: 1=like, 2=somewhat like, 3=neither like and dislike, 4=somewhat dislike, 5=dislike

The degree of the uncertain information in the environment [58] known as Mystery (as a predictor of the preferences for three-dimensional space) was the most preferred construct in the SUP. The findings show that scenes with Mystery are more preferred, which might be related to spaces with more natural scenes [45]. Prediction of Mystery as the preferred spatial configuration in this research can be supported by the findings of many studies such as the natural scenes in the forests or agriculture lands [e.g. 37, 59], in urbanized areas such as old buildings or factories [e.g. 38,,58,60], and combination of natural and urban elements [e.g. 61].

As it is discerned, partial concealment of spaces such as pathways, shadows, layered spaces, and densely vegitated spaces could enhance the Mystery of SUP, as applied in the scenes of the other scholars' findings [62,63]. A contact with the nature as a fundamental value for human beings in terms of health and well-being [64] and the attempt to escape from the crowded urban life [65] with the purpose of stimulating the senses and restoring mental capacities [66] and experiencing the natural [64] or designed landscapes [67] in the urban area could encourage the public to look forward to discovering the scenes. In this regard, instead of open or wide view scenes to make easy decision [68], which offer the ability of seeing the skyline and the urban life in the SUP, the public preferred to see the scenes that offer something interesting to explore. In fact, the notion behind the preference related to whether or not the landscape is interesting to explore [37], could support the research findings. As mentioned by Woodcock [69] and Hagerhall [37], Mystery could be the most significant predictor of the preferences.

Coherence and refuge scenes were also selected as important factors to determine visual preference of SUP. Coherence as a clear order in the physical arrangement of space [70] can be achieved by clear trails, rows of trees, integration between green spaces and flowering. On the other hand, Refuge, (as a place that cannot be seen in order to avoid risks and to increase the safety of environment) [24] is created by tree shade and large amounts of green space. In this trend, Complexity in space offers a variety of components and contains a lot of elements of different kinds [33]. This construct contains various combinations of manmade and natural elements, including crossroads, accessibility to green surfaces, availability of hard ground and pavements, and the variety of geometrical shapes.

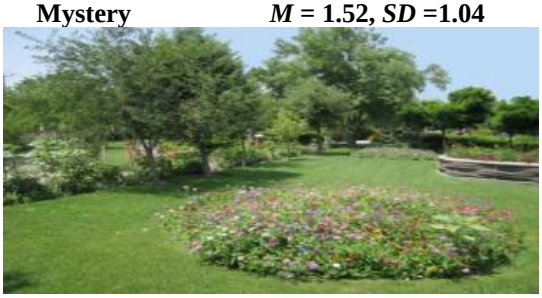
Next, Legibility, as ease of navigation [71] and human's need to understand the environment [30], can be achieved when there is a clear focal point, low amount of shade, plenty of open spaces, and availability of simple or multiple orientations in the park.

In contrast with Mystery, the scenes with wide and unimpeded views [24] known as the Prospect were among the least preferred scenes. Notwithstanding the substantial body of document accentuating the importance of the Prospect [e.g. 24,36,39] some studies show contradictory results [72].

It is asserted that the Prospects are bright and expansive, and yet the Refuges are small and dark although they can both occur continuously, since they are needed together [73]. It can be argued that since in small urban parks Prospect and Refuge do not occur together due to the size of SUP, lack of public interest in watching wide view and bright landscape could be justifiable. In fact, contact with nature as a fundamental human need which relates to human desire to escape from crowded urban life [65] in the urban area could encourage public to look forward to discover scenes. Fig. 3, shows the scenes with high rating means in each category.

**Mystery** ***M* = 1.52, *SD* =1.04**

***M* = 1.57, SD=1.00**

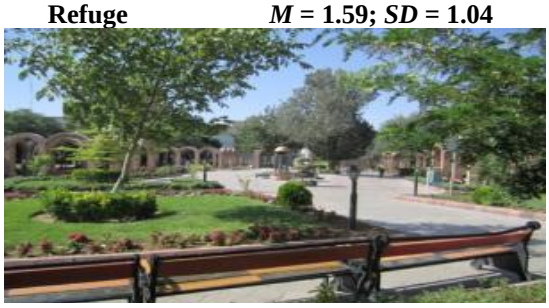


**Coherence** ***M* = 1.54, *SD* = .95**

***M* = 1.67, SD=1.02**

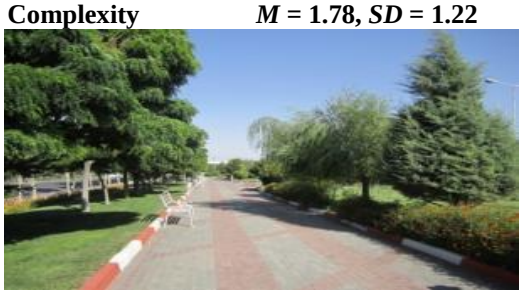
**Refuge** ***M* = 1.59; *SD* = 1.04**

***M* = 1.80; SD = 1.12**



**Complexity** ***M* = 1.78, *SD* = 1.22**

***M* = 1.80, *SD* = 1.18**



**Legibility** ***M* = 2.10, *SD* = 1.24**

***M* = 2.16, *SD* = 1.26**

**Prospect** ***M* = 1.91, *SD* = 1.21**

***M* = 2.09, *SD* = 1.23**

**Fig. 3** Scenes with Highest Rating

In fact, it seems that in the SUP, the public typically prefers to see more natural and hidden areas in comparison with the open space and clear focal points. Escaping from urban life and engaging untouched nature, which offers a sense of exploration could be the reasons behind the findings of this study. In continue it should be said that, in hot and dry countries people tend to prefer cooler and more shaded areas away from the burning sun. The presence of wind can also push people's preference towards sheltered environments.

As a final point, by casting a glance on the spatial configurations of SUP, it could be said that based on internal variables of information processing theory, mystery was preferred more than legibility, while for Appleton theory, refuge was preferred more than prospect.

## 7. Conclusion

Small urban parks are becoming more popular in city landscapes. They could contribute to aesthetic features of a city and give a sense of pride to the community. This study was carried out to investigate public visual preferences of selected SUP in Tabriz, Iran.

It was found that, among the spatial visual configurations, Mystery was the highest while Prospect with a space with broad vista [24] received the lowest preference ratings. Having a glance on the scenes' presented contents and taking into account the extracted information of the panel of experts on the most and the least preferred spatial configurations, it can be concluded that tree shade, combination of irregular trees, shrubs with green cover such as lawn, uncertain paths, dense plants spaces, and finally layered spaces could offer more sense of appreciation for the public in comparison with spaces with wide perspectives that allow easy decision making and a clear view towards the skyline. These findings can benefit landscape architects and other city designers in planning and designing SUPs that are appreciated by the users.

For further research, investigation of other related variables associated with visual preferences could provide a robust way to discover the public's preferences. The findings of such research could reveal the reason behind the complexity of public's preferences. Furthermore, more information regarding the assimilation or integration of other senses could be distinguished among the independent features that characterize individuals' preferences.

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