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Investigating the Role of Urban Landscaping in the Perception of Collective Spaces Using Perceptual Potentials

(Case Study: Third Square of Tehranpars)

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ABSTRACT: The urban landscape is an objective-subjective nature that plays a significant role in the perception of collective spaces by the audience. This is possible only by stimulating the perceptual potentials of users and inducing behavioral patterns to users of a space. This study investigates the role of urban landscaping in the perception of collective spaces using perceptual potentials. This research is descriptive-analytical and, in terms of purpose, is applied. A questionnaire did data collection, and for data analysis, Spearman and Friedman's statistical tests were used in SPSS software. A case study is the third square of Tehranpars, where the target community has also been selected as users of this space. In the data collected from the sample group, the highest level of correlation between the sub-components of objective aesthetics is the composition and color indices with a correlation coefficient of .857. Among the sub-components of subjective aesthetics, the penumbra indices and physical cohesion with a correlation coefficient of 0.690 have the highest level. In addition to the relationship between the proposed indices, the priority of these indices is ranked based on the Friedman test, and it is observed that the indices of composition (7.98), readability (5.89), and physical coherence (5.76) have the highest priority among the ranking of indices in terms of the statistical population. These data-driven priorities can identify design priorities and help take adequate steps to create a vitality urban space.

Keywords: *Urban landscape, perception, perception of collective spaces, perceptual potentials, Third square of Tehranpars.*

INTRODUCTION

Weakness in urban spaces landscaping is one of the problems of today's cities that with the expansion of urbanization and the increase in competition in population between cities, the gap is felt more than ever. The urban landscape has two objectives and subjective dimensions, the separation of these two dimensions causes a deficiency in landscape design. Perception is a mental function performed by the physical senses in humans, and this part forms the common point of landscape and perception. Urban landscape uses components such as religion, tradition, historical contexts, culture. all of which have a significant contribution in creating the conditions for perception and evoking emotions such as a sense of revelation, mystery, or pleasure of the beauty of the environment. The critical point for stimulating citizens' perceptual and emotional potential by landscaping space is to pay attention to the vitality and inclusiveness of a space. Considering the gap felt in the perception of space and the effect of landscaping on it, this research has been done to solve this problem. The main question of this research is the effect of landscaping on the perception of collective spaces, which due to its consistency with previous research, is an attempt to identify and distinguish between landscape and perception features and their importance in the eyes of users of a space. To achieve the research objectives, categorization of essential components of landscape, perception, and explanation of the relationship between them has been done, which can cause more attention to these indices in the design of urban spaces, especially homogeneous spaces with the study sample.

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MATERIALS AND METHODS

Since this research aims to study the qualities, components, and formulation of standards and criteria, the strategy of the present study is ethnography and case study. According to the objectives of this research, the present study is applied in terms of purpose, in terms of nature is descriptive and analytical, and in terms of implementation to test the research questions is the survey. The type of research is descriptive-correlation that investigates the relationship between research components and the whole subject using SPSS software. In simpler terms, it can be stated that all studies follow applied and theoretical studies and seek to solve problems.

Literature Review

Pazhouhanfar and Kamal mention the connection between the restorative components of perceptual and aesthetic potentials with features such as harmony, openness, brightness, and suitability for leisure and mention these features in connection with the title of mediator in the perception of space and landscape and consider these two factors as a way to enhance vitality (Pazhouhanfar & Kamal, 2014). Ali Akbar Heydari et al. Categorized the physical and visual components of collective spaces into three categories: visual, identity, and readability, and in summarizing and evaluating the processed data, introduces the indicators such as historical and recreational elements, natural, cultural, religious. In creating a sense of the vitality of collective spaces and categorizes the obstacles to the success of the operation of these spaces into two main groups: physical problems (in terms of tangible quality) and problems of lack of managerial planning (in terms of intangible quality) that to achieve a collective vitality space, these two influential groups must be confronted (Heydari et al., 2013). Habibullah Razzaghi categorizes essential components of the qualitative desirability of the environment as sense, vitality and happiness, fitness, attractiveness, efficiency, justice, supervision, and selection. Using the analytical diagram of the desirability of the environment for users draws the two-way relationship between the urban landscape and the behavioral patterns of the users of the space, which reveals the effect of the environment on the behavior of users and vice versa (Razzaghi, 2013). Baris Kara calls the basis of perception the storage of images in the mind and expresses the components of perception, including experience and memory, and sees landscape perception as a branch of vision research and practice. He points out that the perspective experience involves the flow of empirical points, images, thoughts, and sense and is a physical experience that occurs at a specific time and place and contributes to the mental well-being of users (Kara, 2012).

Theoretical Foundations

Collective Space

Space in its material sense alone does not present any particular feature. However, as soon as a group of human beings begins activity in a place, the symbolic meaning of space emerges. Hence, space becomes a context for the occurrence of human behaviors. The existence of collective spaces has played a vital role in attracting people and their presence in cities (Habibi, 2007). Event spaces allow people of different generations (race, gender, and age) to be together (Mohammadi & Shaarepoor, 2016).

Urban Landscape

In one sense, the concept of landscape in architecture is the surrounding environment and refers to the tangible and visible space. However, in another sense, it refers to the mentality that plays a role in human beings by facing this physical space. In another case, a landscape can be defined as combining the two, a phenomenon composed of subjectivity and objectivity (Attarzadeh & Salehi, 2015). The urban landscape is the part of the city that the observer receives. In other words, the shape of the city in the urban landscape layer becomes a directly tangible quality; that is, the city landscape is perceptible objectivity and our perceived space of the existing reality of the city around us, so both from objective and subjective aspects is more critical (Zabihi, 2014). According to the points raised from the opinions of urban planners, the criteria related to the urban landscape characteristics can be categorized in terms of each, as described in Table 1.

Dimensions of an Urban Landscape

Given the vastness of the urban landscape and the diversity of content, it should be noted that great experts in urban science have proposed various theories about the dimensions of the urban landscape. Table 2 examines these dimensions from the perspective of various experts.

At this point, it can be said that the urban landscape is an essence that is structured in the combination of function and body for a particular space. These subjective dimensions may be individual or collective. The urban landscape is first formed as an image of the body and, over time, with the addition of experiences and perceptions in different aspects, becomes meaningful. These factors that make up the urban landscape can be artificial (man-made) or natural (green landscape). Based on the definitions and conceptual dimensions of urban landscape presented by various thinkers, the urban landscape is categorized in two objective and subjective dimensions and three components: A) aesthetic (objective-subjective), B) semantic-perceptual, and C) functional-activity in this research.

- Aesthetic components (objective-subjective): The search for comfort outside the home, in particular, increasingly focuses on enriching both the physical and mental needs of the city, and on meeting the demands of residents, it is necessary to create functional places with aesthetic quality (Polat & Akay, 2015). Landscape visualization has always been an integral part of visualization. Assessing these landscapes' quality and visual impact is also an integral part of this visualization (Gobster et al., 2019). The beauty factor and the physical elements of the city are among the factors that play an essential role in the

Table 1: Urban landscape theories

Scientists	Comments on the urban landscape and related concepts	Definition view
Lynch (1960)	The city's image is the mental image that man has experienced, consciously or unconsciously, concerning specific aspects of existing physical reality, within the framework of his personality structure.	Physical
Mahmoudi (2006)	He considers the urban landscape as an objective reality that can be seen in the observation of every person	Physical
Cullen (1961)	One building is architecture, but two buildings are urban landscapes	Physical
Relph (1976)	The concept of landscape expresses places through components such as location, community, personal life, roots and security, and home(hometown)	Physical-social
Mansouri (2004)	The urban landscape is the citizens' understanding of the city which is done by perceiving its symbols (physical dimensions) and associating the meanings related to them (mental and memory dimensions.)	Physical
Golkar (2006)	The urban landscape is a threefold combination of the objective landscape of the city, the subjective landscape of the city, and the emotional landscape of the city, which is the basis of behavior	Physical-social
Atashinbar (2009)	The urban landscape carries meaning, a meaning that results from the experience of the inhabitants of the city throughout history. This nature cannot be abstract; it is related to the body of the city, and people understand it	Physical-social and cultural
Zekavat (2006)	He considers the word "view" to be equivalent to a landscape and considers it as a field of functionality from a specific point, path, and place	Physical
Nussaume (2011)	The urban landscape is the problem of understanding the interdependence and meaning of relationships between buildings, cities, territories, and places	Physical
Hedman & Viazowski (2015)	The landscape of a city is a function of the way buildings are erected, and the way the land is dealt with in response to social and economic needs	Physical Social Economical
Tabibian (2003)	The landscape of a city is a single element or set of elements that have been built over the centuries and, with a few exceptions, are being rebuilt	Physical

Table 2: the dimensions of the urban landscape (as Cited in Vahdat et al., 2015)

Scientists	The dimensions of an urban landscape
Lynch (1960)	Perceptual, physical, functional
Cullen (1961)	Visual and structural
Swaffield (2005)	subjective and objective factors
Pakzad (2005)	Form, function, sense
Golkar (2006)	Objective, subjective and emotional factors
Abdullah Khan (2006)	Visual, physical, spatial, activity, identity, environment
Rezazadeh (2007)	Visual, functional, sense
Mansouri (2004)	Aesthetic, cultural, functional, identity
Farhoodi & Timuri (2010)	Natural and artificial factors

amount of pleasantness and attraction of people to public and urban spaces. We can mention the characteristics of aesthetic and physical factors in urban environments such as unity, readability, determination, and integration of space, dimensions and proportions, form, geometry, confinement, details of body design, and physical cohesion (Pakzad, 2005, 82).

- Semantic-perceptual components: In Theory of Good City Form, Kevin Lynch sets out seven criteria for measuring good city form; Vitality, sense, fit, access, control and authority, efficiency, and justice. According to Lynch, the criteria for measuring sense include five subheadings: structure, identity, transparency, consistency, and readability. Identity and structure are calculated from the formal components of sense. In other words, identity can be considered equivalent to "sense," and in the city, it can be considered equivalent to recognizing one place and distinguishing that place from another (Vahdat et al., 2015).

- Functional-activity components: Public spaces provide

grounds for a wide range of activities, from daily activities to periodic celebrations, individual to collective, active and inactive. Activities such as watching, listening, and experiencing others, and actively and passively participating in the place, bring vitality. At the same time, the activity dimension of public spaces is directly related to the uses and functions around the environment; the greater the amount of absorbing and diverse functions in urban spaces, the greater the diversity of activities (Vahdat et al., 2015).

Perception

In art and architecture, the perception and thinking were considered as the basis of the process of urban planning and continues to be, as architecture throughout history, has been a vehicle for the expression of human thought and innate desires that have tried to correlate the crystallization of their intellectual and cultural themes with material drawing and conceptualization (Abbasi & Habib, 2015). In the discussion of perception, we need to consider that although the system of feeling and perception is the same in all of us, we have a different perception of our surroundings (Fig. 1). Perception of the environment is a function of the ability to receive sensory receptors, which is a function of environmental conditions affecting the senses such as light, temperature, humidity, wind pressure, noise, smell. (Faraji & Ibrahimzadeh., 2015). Human behavior is the result of a person's motivations and needs, the capability of the environment, a person's mental image of the outside world, resulting from his/her perception and the meaning that this image has for him/her, which in public spaces occur with the presence of humans in space and time (Askarizad & Safari, 2020).

Perceptual Potentials (Factors Affecting Perception)

Perception is multidimensional and multidimensional. Sound, smell, and touch are other dimensions of aesthetics. There is little comment and organized research on the various dimensions of perception. Few studies have been associated with the sense. Rasmussen (1959) researched ambient sound qualities. Southworth (1969), in his studies, showed that sound quality affects the perception of the general characteristics of the environment. These studies have been that formal and symbolic visual features are not the only determinants of aesthetic quality. The factors can be placed in two categories: factors related to the stimulus (environment) and factors related to the person.

Environmental Factors

Conditions of Perception: The information sent by an environment is not available to us in all circumstances or different situations. Perception of the environment is a function of the ability to receive sensory receptors, which is a function of environmental conditions affecting the senses such as light, temperature, humidity, wind pressure, noise, smell. (Pakzad & Bozorg, 2014, 48).

The distance between the object and the observer: Shorter distance the purpose of this research is to study the qualities, components, and formulation of standards and criteria, the strategy of the present study is ethnography and case study. According to the objectives of this research, the present study is applied in terms of purpose, in terms of nature is descriptive and analytical, and in terms of implementation to test the research questions is the survey. The type of research is descriptive-correlation that investigates the relationship between research components and the whole subject using SPSS software. In simpler terms, it can be stated that all studies follow applied and theoretical studies and seek to solve problems. Shorter distances lead to a more excellent detail perception, and longer distances lead to the perception of the general spots of things. Our distance from the subject affects what we perceive. Also, the closer one gets to the movement's goals, the more the appearance of those goals will change. This manifestation of perspective is an essential part of the perception that transforms

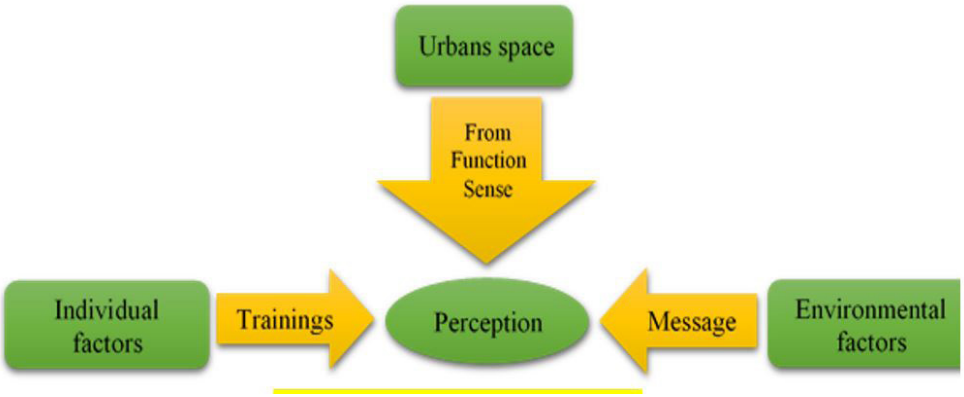

Fig. 1: Perception process

the simultaneity of space into a sequence of time (Arenheim, 2013, 85-87).

Scale: Another thing that should not be forgotten about its effect on perception is space scale. Defined spaces, given their perceived size, scale, and fitness, can contain solid emotional references. The scale of space consists of two components: the size of the space and the size of its background, and the space's size compared to the observer (Faraji & Ibrahimzadeh., 2015).

Time: To achieve a sequence in the perception of a set of images and scenes, we can also name time simultaneous with movement. Man's presence time in space exposes him/her to all the stimuli associated with scenes in space. However, according to psychological studies, it can be argued that all the details, despite the effect on the nervous system, are not perceived at the same time. Furthermore, there is a kind of precedence and time lag in perceiving the details of a scene. Time affects the perception of the environment in terms of the different rhythms it creates in the environment. Time can be considered regular and irregular rhythms in daily and seasonal periods of short-term and long-term sequences. These different rhythms have an essential effect on the perception of the environment (Masoudi, 2003).

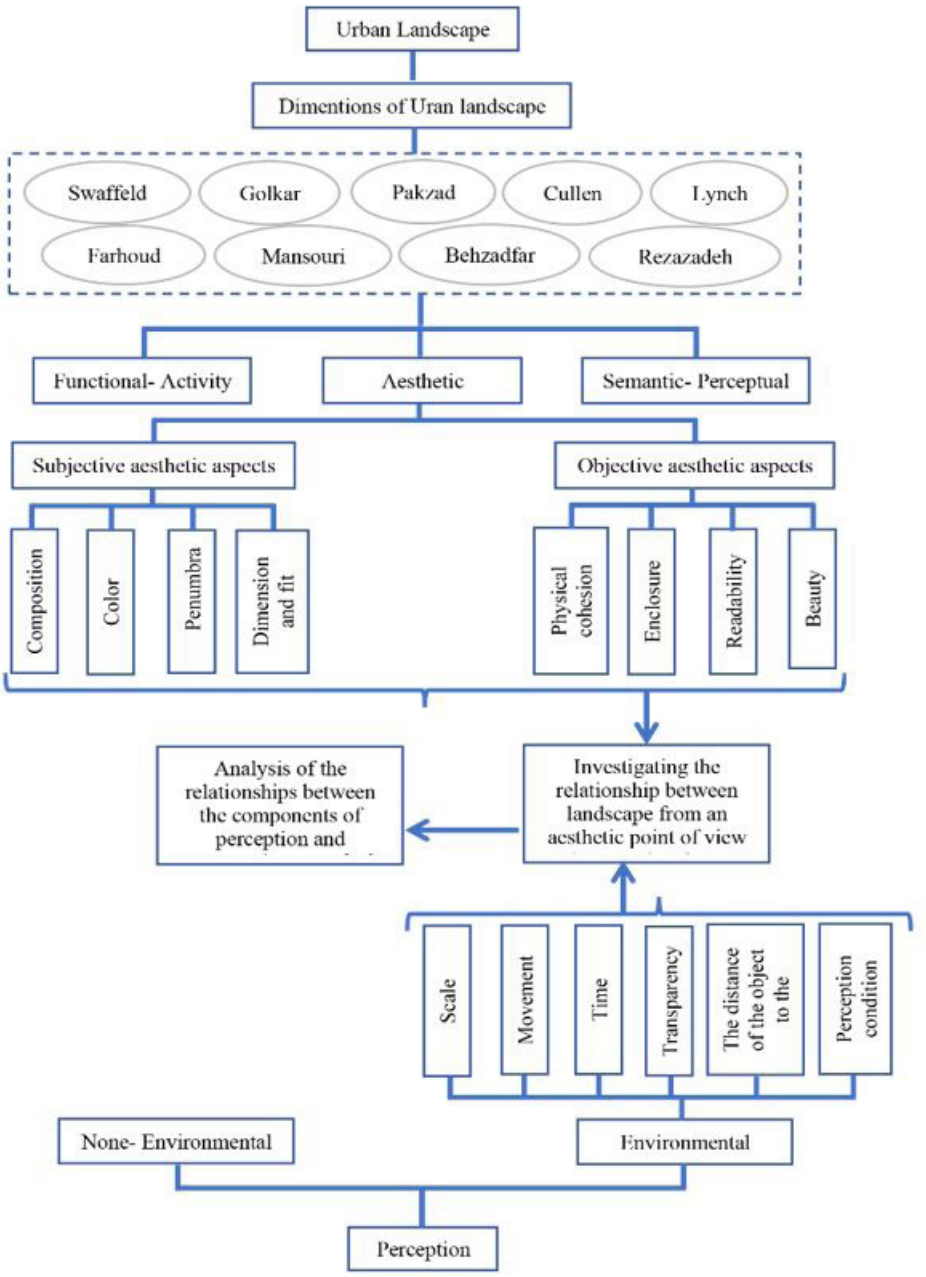

Fig. 2: Theoretical framework

Movement: Movement is a crucial factor in perceiving the environment. As Rapaport has said in the previous quote, human attention is drawn to the environment when consecutive perspectives are received as it passes. Such environments attract more attention than environments that do not have such perspectives. On the other hand, if the distance between consecutive perspectives is too small, the frequency of changes in the visual array will be incomprehensible. It will not have the necessary transparency (Lang, 2009, 116).

Transparency: The search process takes place at different levels: First, information acquisition enhances exploratory consistency. Second, recording information boosts neural activity generated in the brain. There is not much knowledge about this process. Although the primary process can be universal, a pleasant perception of transparency, complexity, or order depends on human circumstances and attitudes. Some of these cases also deceive people. Transparency can be obtained from the error of depth, line, and form. Architects have used such errors for centuries to obtain aesthetic results (Faraji & Ibrahimzadeh., 2015).

Develop a Theoretical Framework

As mentioned earlier in the theoretical foundations, the urban landscape is realized in both objective and subjective aspects in the city's body. According to the mental process of perception that occurs from space, the landscape effect on space perception is also registered. If the landscape is considered the sender of the message and the user of the space is considered the receiver of the message, the human senses have also become channels of message transmission that perceptual potentials (environmental and non-environmental) affect this perception message. Therefore, among the various indicators proposed for both landscape and perception components in this field, the more prominent indicators in space have been used. The relationship between both categories of indicators has been examined (Fig. 2).

Statistical Methods of Data Analysis

The indices and components are written in the questionnaire designed and used separately to collect the data needed to achieve the goals and analyze the relationships. For the analysis of the relationship between questionnaire indices, the SPSS statistical software was used. To analyze the inferential statistics entered in the questionnaire, the Spearman correlation index test (nonparametric) was used to determine the correlation between the indices. The Friedman test was used to examine the relationships between the indices. In this regard, the Cochran model has been used to determine the sample size, and questionnaires have been used.

Recognize the immediate area and area of direct intervention

Natural landscapes to the north and east of Tehran, favorable climate, the existence of densely populated residential context, and the use of urban development reserve areas to organize worn-out structures, improve sidewalks and passages, as well as proper access to main streets and highways, are the features of this neighborhood. This area has 2,140,364 square meters of residential space, 191,082 square meters of commercial and service space, and 1,405,109 square meters of the road network (Fig. 3). This area has an area of about 4,028,956 square meters and a population of 103,911 people (Municipality of Tehran, 2016).

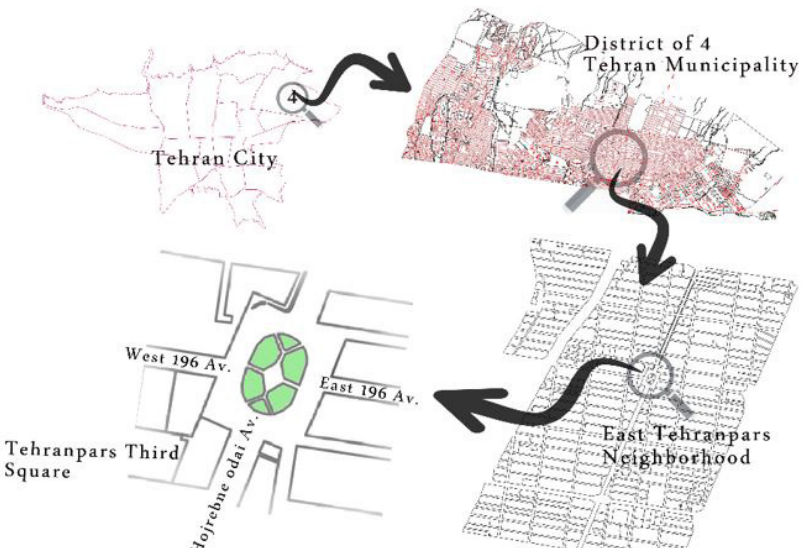

Fig. 3: Status of the study area in Tehran

RESULTS AND DISCUSSION

According to the research objectives, to verify the results, we must first analyze all the landscape components in both the objective and subjective aesthetics and the indices of perception. The analysis of the tests in each classification has been done separately and their relationship with each other. According to the tests presented, all the quantitative and qualitative results can be seen.

Analysis of Urban Landscape Features

Analysis of essential components in the urban landscape that in both subgroups of objective and subjective aesthetics and their ranking, by performing the Friedman test on the results (Table 3) obtained from the questions related to the index, indicates their priority in the view of users of the study space. The table below shows all the sub-components concerning the sum of the questions related to each index. In a general view, it can be seen that the first four indices in the classification of the most important. Indices of an urban landscape, two indices belong to objective aesthetics, and two indices belong to subjective aesthetics. This means that both groups have an equal share of the crucial sub-components of urban landscaping from the users' point of view, and this point can guide the designers in prioritizing the features when designing or redesigning the space and can be effective in achieving a vital urban space that responds to the needs of users.

Investigating the Relationship between Landscape Components

The analysis of the components affecting the urban landscape, both in the subgroup of objective aesthetics and subjective aesthetics, was performed individually (Table 4). At this

Table 3: Ranking of effective indicators of the urban landscape

	Rank
Composition index	7.98
Color index	2.38
Penumbra index	1.00
Fit index	5.39
Readability index	5.89
Enclosed index	4.65
Cohesion index	5.76
Beauty index	2.97

Table 4: Relationship between urban landscape components

	Indices	Composition	color	Penumbra	fit	readability	enclosed	cohesion	beauty
composition	Correlation coefficient	1.000	.857**	.650**	.670**	.279	.387**	.657**	.314*
	Sig	.	.000	.000	.000	.064	.008	.000	.033
color	Correlation coefficient	.857**	1.000	.581**	.609**	.303*	.190	.597**	.426**
	Sig	.000	.	.000	.000	.038	.197	.000	.003
Penumbra	Correlation coefficient	.650**	.581**	1.000	.462**	.303*	.381**	.690**	.537**
	Sig	.000	.000	.	.001	.038	.006	.000	.000
fit	Correlation coefficient	.670**	.609**	.462**	1.000	.175	.355*	.563**	.085
	Sig	.000	.000	.001	.	.257	.014	.000	.570
Readability	Correlation coefficient	.279	.303*	.303*	.175	1.000	.015	.385**	.096
	Sig	.064	.038	.038	.257	.	.921	.008	.519
Enclose	Correlation coefficient	.387**	.190	.381**	.355*	.015	1.000	.162	.105
	Sig	.008	.197	.006	.014	.921	.	.261	.466
cohesion	Correlation coefficient	.657**	.597**	.690**	.563**	.385**	.162	1.000	.479**
	Sig	.000	.000	.000	.000	.008	.261	.	.000
Beauty	Correlation coefficient	.314*	.426**	.537**	.085	.096	.105	.479**	1.000
	Sig	.033	.003	.000	.570	.519	.466	.000	.

point, the relationships between the indices have been done with the Pearson test. In the proposed matrix, the results of the effect and the relationship between the components can be seen. The composition index has the highest correlation among the objective aesthetic indices with the color index and the composition index (0.857) from the same subgroup in this analysis. Then the strongest correlation is established between the two penumbra and cohesion indices (0.690). In these two relationships, it can be seen that the relationships between components of the objective aesthetics subgroup have more effective relationships with each other. These relationships are placed in lower degrees of relationship with each other for other components, ranging from 0.5 to 0.6. It should be noted that the highest degree of correlation between the indicators of both aesthetic groups is related to the composition component and has a more significant impact on the majority of indices.

Make the scale of the space understandable to the user and provide better conditions for recording the subjective images of the citizen.

- In a general conclusion, it can be clearly stated that all the indices discussed in the subgroup of subjective aesthetics have irreversible effects on the perception of space in a transparent way, forcing users to move and use behavioral sites, as well as understanding the space in the least possible time at all hours of the day and night (Table 5).

Finally, it is possible to analyze these relationships so that the urban landscape and all its indicators directly and substantially affect the perception of space, vitality, absorption, and significance of the population in space. If it is modified, space can become a 24-hour and competitive atmosphere in the city.

CONCLUSION

An important point that can be seen in the theoretical framework of the research is the direct influence of environmental factors on the perception of each individual. Since the perspective of urban space can include all environmental factors, it affects the perception of space in both its subjective and objective dimensions. The similarity between the indices of environmental factors of perception and landscaping is a reliable point for designers in stimulating the senses and perceptual potentials among space users. It can play an essential role in creating and strengthening the feelings of each person. On the other hand, paying attention to the principles of environmental psychology, the core of which is perception can meet urban spaces to meet the needs of clients, and urban spaces can be straightforward design solutions based on these principles and brought it to the peak of vitality and function. Urban landscape, regardless of any category, from green to machine landscape with the impact of different patterns and contexts of history, culture is an integral part of the space that, by designing based on the principles of environmental psychology as well as perceptual indices, can capture a meaningful image of space in the minds of citizens.

The most crucial difference between Tehranpars' third square as an urban space and other homogeneous spaces is micro-spaces with different hangouts and behavioral settings. Furthermore, this high level of inclusion in space can encompass a wide range of perspectives at different levels of gender, age, and activity. Relying on statistical tests performed on data extracted from the answers of the statistical community (Spearman and Friedman), the relationship between the indices of the two components of objective and subjective aesthetics was tested. Among the indices related to the objective aesthetics component, color and composition indices have the highest correlation with a correlation coefficient of 0.857, and in the indicators related to the subjective aesthetics component, two indices of penumbra and physical cohesion with a correlation coefficient of 0.690 have a stronger correlation among other indices. Other indices such as physical cohesion have an effective relationship with color and composition with correlation coefficients of 0.597 and 0.657., respectively, and the detailed information and study conditions in Table 4 can be fully observed and analyzed. The ranking among all the landscape indices performed by the Friedman test shows that the composition indices (7.98), readability (5.89), and physical cohesion (5.76), respectively, from the users' point of view, have the highest priority in terms of space. The relationship between urban landscape and stimulation of perceptual potentials in citizens is also an essential point that by field studies and analysis of half-open questions of the questionnaire show that each of the landscape factors has a more significant impact on the environmental perception of each person, that among them the indices of composition, readability and physical cohesion can be mentioned as effective indices and other relationships can be seen in detail in Table 5.

The study results show the direct relationship between landscape indices and citizens' perception of space directly. The effect of these indices on the formation of collective and individual behaviors that are closely related to the population brings and population evasion of urban space. Therefore, the attention of urban designers to these indices is significant to design vitality spaces and reduce social anomalies and crime during the hours of using the space, especially at night. Considering the two-way effect that the environment has on behavior and vice versa, this study can be a clear roadmap by examining the relationship between the components of urban landscaping and the resulting perception in users for designers with low anomaly and high vitality in designing spaces, and this can be the difference between this research and other similar researches.

Lack of attention to the correct design of the urban landscape is one of the fundamental causes of functional wear and tear that, like a catalyst, can multiply this process as various theories of anomaly and delinquency such as the theory of broken windows have been proposed directly concerning

Table 5: Relationship between landscape components and perception

	Perception					
Subjective-objective Aesthetics	Indices	Distance from object to the observer	Perception condition	scale	transparency	movement	Time
	composition		■	■	■	■	■
	Dimensions and fit	■	■	■			
	color		■		■		
	Penumbra	■	■			■	
	enclosed			■		■	
	readability	■		■	■	■	

the urban landscape. This research also examined this issue in simple language among different strata and achieved their priorities by classifying and analyzing these results, paying attention to different cultural, educational, religious, customary. Fields while examining the indices have achieved the desired comprehensiveness in the questions and data collection. Different strata, with different perspectives and different emotions, use all the spaces. This diversity in the target groups demands different needs from the urban space, whose priorities cannot be ignored or underestimated. Analyzing these priorities and their relationships can be a cornerstone for advanced analysis in other studies or even extensible indices for similar spaces. Consistency of information and experience can shorten ways to solve problems and provide more efficient design teams.

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