

Research Paper

The Landscape Aesthetics' Perception in Persian Garden Case Study: *Delgosha Garden in Shiraz, Iran*

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Abstract

This study discusses some factors affecting landscape aesthetics' perception in Persian gardens, with a case study of Delgosha Garden in Shiraz, Iran. To this end, the main physical elements of the Persian garden are identified, and their aesthetic value is assessed by analyzing landscape preferences in three steps: First, the appreciation of main physical elements in Persian garden is discussed; second, their effects on landscape preferences are examined employing photomontages; and finally, the visual impact of main physical elements of the garden, on aesthetical quality of the landscape, is quantified through a statistical model. An analytical-descriptive method is adopted to achieve this goal, and a statistical population including three groups of inhabitants is involved in the survey from November 2023 to December 2023. Three approaches were also used to analyze the landscape preferences. The main study tool is a questionnaire on aesthetic values. For data analysis, one-way ANOVA, paired sample T-test, and regression model were performed, using SPSS 24. This made it possible to determine if and to what extent the Persian garden's aesthetic values are shared among this study's participants. The results demonstrate that the alteration in the existence of the main physical elements in the Persian garden would lead to different aesthetic perceptions in three groups of interviewees. These findings may help landscape architects and urban designers in further designs to consider and prioritize the main architectural elements based on their impacts on different generations.

Keywords: *Landscape, Perception, Persian garden, Delgosha garden.*

INTRODUCTION

The landscape perception and the factors which influence it have been one of the main concerning issues among landscape architects and urban planners during the past 50 years. Coeterier (1996) defined the main purpose of landscape perception as providing people's brain with a coherent, meaningful picture of the outside world, which is constructed by selecting certain information. He claims that "This process of selection is not individually but culturally determined" (Coeterier, 1996, p. 28). Bell (2012) mentioned that landscape perception is a purposive and selective process in which people need to know "how the image components of a landscape are connected" (Bell, 2012, p. 68). He stated that people's perception of a

specific landscape may vary according to their knowledge, culture, and experiences, which makes them seek the familiar patterns in that landscape. Kaplan and Kaplan (1989) admitted that the ways in which humans perceive the landscape depend on their need to gather and correctly interpret information from the surrounding environment. They argued that "coherence, complexity, legibility, and mystery" form the main basis of visual preferences, although Stamps (2004) has put some doubt on the reliability of this hypothesis.

Some authors have emphasized that landscape perception is a complicated phenomenon, including both biological and learned components. They declared that the perception of landscape differs according to the social group, job type, familiarity, age, and other factors such as culture (Balling & Falk, 1982; Bernaldez et al.,

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1989; Gómez-Limón & Fernández, 1999; Herzog et al., 2000; Kaltenborn & Bjerke, 2002; Kaplan & Talbot, 1988; Lyons, 1983; Strumse, 1996; Zube et al., 1983; Zube et al., 1985). The perception of the landscape may be modified over time with changes to the territorial system, landscape, and society that produced it” (Antrop, 2005, p. 22). Bell (2012) believed that the landscape perception process is primarily visual, as sight is the dominant sense through which people perceive and interpret patterns and meanings in their environment, forming the foundation for visual appreciation, which is essential for emotionally connecting with and experiencing the aesthetics of the landscape. So, the visual preferences for the physical aspects of a landscape have the most impact on the aesthetic perception. “This theory focuses on the physical elements of landscape (trees, water, etc.) or attributes of physical elements (form, line, color, texture, spaciousness, etc.), and probes the relationship between physical landscape elements and landscape preference” (Cheng, 2007, p. 18). Kaplan and Kaplan (1989) and Appleton (1996) stated that the innate preferences are driven by the presence or absence of some physical elements and the necessity to rapidly gather the information. On the other hand, Bourassa (1990) suggested that aesthetic experience has three modes of “biological (genetic), cultural and personal (learned)”. To confirm this theory, Antrop (2005) indicated that although the landscape aesthetic appreciation depends on many factors which may be common to everyone and stable in time and space, other factors are determined by the social context in which a person lived in childhood and early adolescence, and the experiences gained in adulthood. This study is going to highlight some elements that affect landscape perception, focusing on the aesthetics of the Persian garden as the main Iranian landscape, and to determine which elements improve or worsen its visual quality. According to the theories mentioned above, the landscape aesthetics in Persian gardens can be the result of the continuity in its physical elements over the years, despite major and fundamental alterations in the primary meaning and activity systems, especially in several periods of drastic cultural changes.

LITERATURE REVIEW

Several studies have been carried out with different attitudes toward Persian gardens, but a few of them have surveyed the garden’s aesthetic effects on human beings. Previously Mansouri (2005) stated that “for Iranian, aesthetics is rooted in primary concepts of nature and landscape elements, and interaction of different components in the garden follows a dual aesthetic system, so that on one hand it is based on a

sensible perception and pleasure for human senses, and the other hand it has a symbolic character”. He introduced the aesthetical factors of Persian garden as: “infinite perspective, presence of water, spatial variety and independent spaces, interaction with nature, a place for reflection, rectangular geometry, introversion, a two-color garden”. Also, Masnavi et al. (2018) have discussed that the aesthetic principles in Persian gardens are rooted in basic humanistic beliefs toward nature, which are expressed in the structure of some elements such as rectangular geometry, spatial diversity, the presence of water, and an infinite landscape. Then these researchers expanded their results and concluded that by applying aesthetic principles in urban parks, it is possible to improve the spatial quality and create a sense of belonging to a place. Toosi and Emamifar (2011) believe that since Persian garden elements are purposeful and are presented in geometric systematic forms, they have been able to play an important role in the aesthetic of gardens, as much as possible. The common point in all these studies is that the factors influencing the perception of landscape aesthetics in Persian gardens are mainly physical elements in a specific order, which have the most impact on their visual preferences.

Persian Garden’s Physical System

In Persian gardens, all natural elements have congregated to produce a space in which people can enjoy and praise nature. Besides, Iranians created the garden with a special organization system, so that it could be a physical manifestation of their worldview of the promised paradise. Before Islamic era, the garden was considered as an “allegory of cosmos through the consecration of nature” or in other words a “reconstruction of the cosmic event and the rebirth of the heaven” (Dadbeh, 2005, p. 30), but after spreading Islam in Iran, this attitude was transplanted to Islamic thoughts, and during Islamic periods, “efforts to make the gardens as similar as possible to the paradise described in Qur’an” (Schimmel, 1976, p. 26), caused a re-creation in semantic paradigm of Persian garden. Of course, none of these historical and cultural evolutions caused any remarkable changes in the garden’s physical systems. Maybe because “the garden is formed as simple and clear as possible and does not leave material ambiguity in the relationship between man and space” (Mirfendereski, 2005, p. 10). Fatemi (2022) highlights geometry as a key unifying element of the physical system of Persian gardens, which many experts consider fundamental to their importance. The physical system of the Persian garden integrates a water system, planting (vegetation), and architecture.

Planting (Vegetation)

“Planting in an Iranian garden has a system that arranges plants and trees in three ways: linear, surface, and volume, in regular and square plots. This system causes a special spatial quality in a proper association with the irrigation system” (Shahcheraghi, 2010, p. 69). The front side of the building has an open and long space in the main landscape site. To avoid making a barrier on this front side, short plants are planted which do not block the view (Nassehzadeh & A'zami, 2010). No trees are planted in the main axis, and usually fountains and waterworks are placed. For emphasizing the main axis and middle plots, a covered hallway of trees, usually in a combination of deciduous and non-deciduous trees, is planted.

Water System

One of the main features of Persian gardens is a great tendency to show and perform water (Pirnia, 1995). In all parts of Persian gardens, the optimum composition of site, environment, and resources is used. Since Iran is in an arid region, one of the goals of Persian gardens is to create a better microclimate for inhabitants. Therefore, water streams seem to be necessary in those gardens (Aryanpour, 1986). By straight canalling, water wastages will be reduced by dividing the garden into geometrical shapes, which has continued in all historical periods (Jeyhani & Omrani, 2007). The display of water in a Persian garden is mainly linear and surface. In linear mode, this representation includes movement of water in streams, water circulators, small waterways around pools, and fountains made with natural water pressure, according to the law of related containers. In surface mode, water display is a reflective surface of water which is stored in large pools, a horizontal water surface in a shallow pool with various square, rectangular, and polygonal shapes, flowing and falling water on the paved levels of the sloping ground, and in wave formers (Soltanzadeh & Soltanzade, 2017).

Architectural System (Structures)

Iranian culture doesn't separate humans and nature. This principle in Persian garden emerges through creating semi-open spaces like pavilion (*Kushk*),

usually with a terrace open to the main view of the garden, which connects it to the built spaces (Zarabadi et al., 2011). There are two main scales in Persian garden buildings: “Large scale that contributes to the main space of the garden and extrovert life, and small scale that defines the perimeter of the garden and introvert life, which does not disturb the main space geometry order” (Mirfendereski, 1995). Based on this, the “Architectural system follows rectangular shape of the garden” (Shahcheraghi, 2010, p. 83), so that the landscape inside the garden keeps its complete geometrical shape. Sometimes the main building is positioned at the intersection of two main axes, in the middle of the garden with an open view, and the secondary building and portal are located around it. Sometimes the main building is on one side of the longitudinal axis with a third ratio, and other buildings are around it with two crossing ways. In both conditions, the main landscape is located along the longitudinal axis of the garden.

This research aims to identify the aesthetic tendencies in Persian gardens, which, as discussed above, are influenced by their physical system (planting, water, and architecture) and the integrating geometrical structure, with a focus on the main axis of the garden. Furthermore, studies show that the arrangement of the content in a visual landscape significantly affects people's preferences for the landscape (Kaplan & Kaplan, 1989; Kaplan et al., 1998) So, in this study authors endeavor to explore the consequences of eliminating Persian gardens' physical components to comprehend the importance of them to users, by assessing their aesthetic perception of the Persian garden's landscape.

MATERIALS AND METHODS

The query is based on the case study method (Groat & Wang, 2002), using a combination of strategies and content analysis techniques. The information is collected through library and field studies and completed through visiting *Delgosha*¹ garden as the case study and analyzing its components using the statistical software "SPSS". The main views of the *Delgosha* garden from the two main axes were identified (Figure 1), and images of these areas were taken. Among them, four photos were chosen from four points of view in the main axes by considering all

garden's main building was restored and a two-column porch was added to it. (Aryanpour, 1986). The garden's geometrical structure is a rectangle which is stretched north to south, and as quoted from *Farsnameh-Naseri*, its length is 400 meters and the width is 250 meters (Hosseini Fasai, 2003). This garden is now at the disposal of the *Shiraz* municipality and is used as a public park.

¹ *Delgosha* Garden is located in *Shiraz*, the capital of *Fars* Province, in the southwest of *Iran*. Garden of *Delgosha* in Farsi means: a garden which lifts one's heart and spirit. The foundation of this garden goes back to the *Sasanid* era, and it has been improved since the Islamic times of *Iran*. Its development history goes back to the *Al-Inju* and *Al-Muzaffar* dynasties. After so many damages done to this garden in different historical periods, during the *Qajar* era, the

the garden's physical system features (water, vegetation, pavilion) at the same level of vision (Figure 2). The direction of the viewpoint is also shown in Figure 1.

Photographic media were used to evaluate the scenic quality of landscapes. This method has been widely used in this field of research. "Empirical findings suggest that there is a close relationship

between landscape appreciation made on site and appreciation of a photo" (Tempesta, 2010, p. 260). Also, comparing the results of several researchers, Stamps (2000) had 4200 participants evaluate 1215 scenes and found that the score of the static color photograph was highly correlated to the score obtained on site ($r = 0.83$). Palmer and Hoffman (2001) also found a similar result ($r = 0.78$).

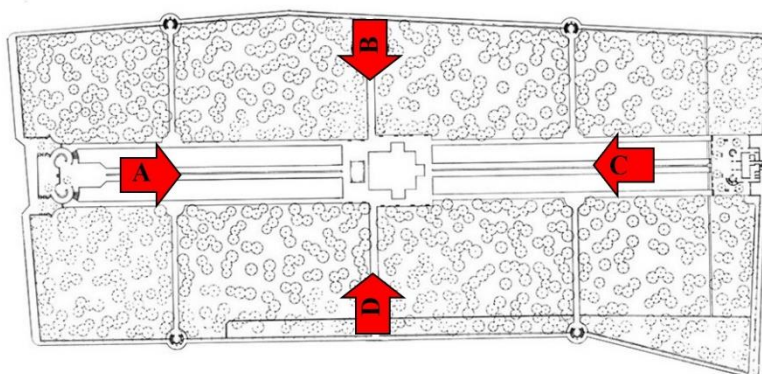


Fig 1. Delgosha Garden Plan (Source: Diba, 1981)



Photo A, main axis



Photo B, sub-axis



Photo C, main axis



Photo D, sub-axis

Fig 2. Main Views of the Delgosha Garden (Source: Authors)

All photographs were taken in November 2023 and include the Persian garden's physical features. In all photos, the pavilion is at the focal point along the main axis, and in each photo, one side of the building is visible. The pavilion has been rebuilt several times in historical periods, with minor changes in appearance.

Photo A is the view of the main axis from the garden's entrance, which seems to be the most comprehensive one, as it has all the physical elements inside. In photo B, there is an old tree along the sub

axis, which means that maybe there were no sub axis here in past, because according to Persian garden principles nothing would block the view of axis, especially next to the pavilion, or maybe it had just grown there unintentionally and the former owners didn't want to cut it down. Photo C has no water in the main axis, although due to the garden's plan, it seems that it has been eliminated in recent decades. In photo D, like photo A, all the physical elements are present.



A1: water eliminated



A2: axis eliminated



A3: Pavilion eliminated



A4: water and axis eliminated



A5: water and pavilion eliminated



A6: Pavilion and axis eliminated

Fig 3. Photomontages on Main View A (Source: Authors)



B1: water eliminated



B2: axis eliminated



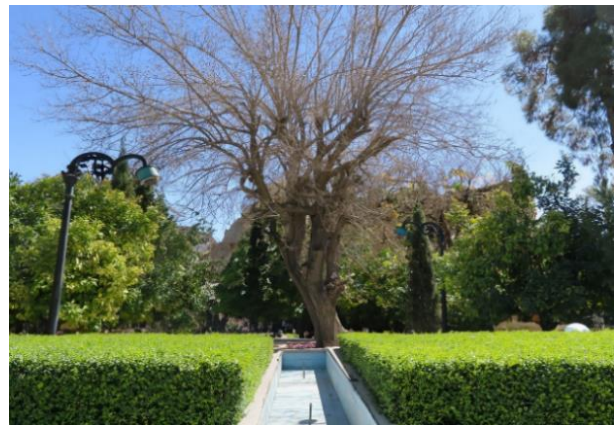
B3: Pavilion eliminated



B4: water and axis eliminated



B5: water and pavilion eliminated



B6: Pavilion and axis eliminated

Fig 4. Photomontages on Main View B (Source: Authors)

To examine the landscape aesthetic significance of the Persian garden, the selected photos are edited in Adobe Photoshop software using Adobe Firefly¹, considering the elimination of their physical elements (Figures 3, 4, 5, 6). The photomontages are realistic and almost indistinguishable from a real photograph.

¹ Firefly.adobe.com

Stamps (1992) found that the use of photomontage does not modify the appreciation of the landscape. Only a few people can identify photographic alteration, and the effect on the scoring is negligible (Stamps, 1993).

The eliminated physical elements in photomontages are waterways and pools, the pavilion, and the main axis. Of course, in this research, vegetation is not omitted due to its obvious influence as an important feature in Iran's hot and dry climate. In other words,

vegetation and planting systems are the main factor that causes Persian garden formation. So, the elimination of plants in the photos seems to be unnecessary because, without vegetation, no one in Iran would recognize the garden as a garden.



D1: water eliminated



D2: axis eliminated



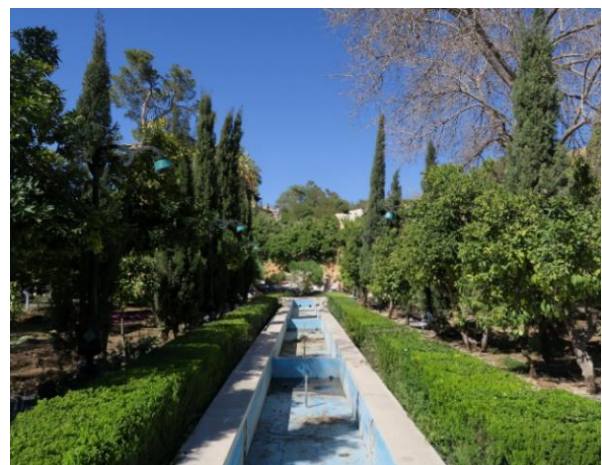
D3: Pavilion eliminated



D4: water and axis eliminated



D5: Pavilion and water eliminated



D6: Pavilion and axis eliminated

Fig 5. Photomontages on Main View D (Source: Authors)

The number of interviewees was calculated through the Morgan table (Krejcie & Morgan, 1970). Considering the size of the statistical population, which is the natives of Shiraz city and the rural areas near it, the number of samples would be 384 people. The participants provided information on their current and childhood place of residence (city/town center, suburbs, village), and outings in the garden. The aesthetic questionnaire of this survey is based on Tempesta's (2010) studies, which are compatible with this subject; So, its validity and reliability have been checked before. Also, a simplified questionnaire was used for the children. The average scores of the garden landscape aesthetic were then analyzed to determine if and to what extent perception alters with age. To verify the effect of the presence or absence of some elements, the scores for the photomontages were compared using parametric tests.

the adults (more than 35 years old). The number of interviewees in the three groups is equal (128 persons per group) to get a more accurate result, and their characteristics are shown in Table 1.

RESULTS

Interviewees' Characteristics

All interviewees lived in Shiraz and its rural areas. They were chosen randomly from people in the surroundings of the Delgosha garden and had visited it before. To develop the survey, 24 photos were organized and presented to interviewees on a laptop to display a better quality (compared to the paper version). Following a well-established methodology (Daniel & Boster, 1976), the interviewees were asked to use a scale from 1 to 10 to evaluate the beauty of the image (where 1 means less preferred and 10 means most preferred). The photos were shown for approximately 8 seconds to obtain the first impression from the following groups: The children (from 7 to 18 years), the young adults (from 18 to 35 years old), and



C2: axis eliminated



C3: Pavilion eliminated

Fig 6. Photomontages on Main View C
(Source: Authors)

Table 1. Interviewees' Characteristics (Source: Authors)

Characteristics	Children	%	Young adults	%	Adults	%
Gender	Male	45.32	Male	59.38	Male	46.88
	female	54.68	female	40.62	female	53.12
Age	7-18 years	33.33	19-35 years	33.33	More than 35 years	33.33
Educational level	Primary school	49.22	University degree	60.94	University degree	32.81
	High school	50.78	Others	39.06	Others	67.19
Sector of activity	None	100.00	Architecture	6.25	Architecture	1.56
			Industry	35.16	Industry	18.76
			Services	39.06	Services	34.37
			None	19.53	Retired or housewife	45.31
Actual place of living	Urban area	82.81	Urban area	70.31	Urban area	63.28
	Rural area	17.19	Rural area	29.69	Rural area	36.72
Childhood place of living	Urban area	82.81	Urban area	64.06	Urban area	54.69
	Rural area	17.19	Rural area	35.94	Rural area	45.31
Number of visits per year	Yes	64.84	1-5 times	73.44	1-5 times	29.69
	No	35.16	More than 5	26.56	More than 5	70.31

The Perception of Landscape

The scores that three groups of interviewees attributed to each image were compared. Overall, the children gave higher scores (mean=7.158) than the young adults (mean=6.337) and adults (mean=6.542). The differences in all the scores are statistically significant ($p < 0.05$). These results agree with other studies (Herzog et al., 2000; Lyons, 1983), which report that children approach landscape evaluation with a great deal of enthusiasm. The adults gave higher average scores than the young adults. The children's high scores may have been derived from poorly defined preferences. The qualifications and specific training among the younger adults, who are mostly university students or graduates, might in some way encourage a more critical view of the landscape. On the other hand, comparing the total mean scores between all groups,

main axis A (mean=7.516) is the most preferred, and main axis C (mean=5.568) is the least preferred landscape. The elimination of water in the main axis C, which has been done in contemporary reconstructions, may be an important reason for this unwillingness.

“As in other studies (Stamps, 1999), the adults' and young adults' scores are close ($r=0.96$). Between children and the two other groups, the correlation is lower (children-adults, $r=0.88$; children-young adults, $r=0.86$). This finding is common in the scientific literature. Stamps (1999) reviewed 24 papers and estimated an average correlation coefficient of 0.61 between younger people (age less than or equal to 12 years) and people over the age of 12” (Tempesta, 2010, p. 267). Table 2 reports the average scores per type and groups of interviewees, and Table 3 reports the statistical significance of the differences between the means estimated by an analysis of variance.

Table 2. Average Score for Landscape Types; Data Ordered by Average Score (Source: Authors)

Groups	Landscape types	Mean	No.	Std. deviation
children	Main axis A	7.953	128	1.336
	Sub-axis B	7.094	128	1.818
	Main axis C	6.011	128	1.419
	Sub-axis D	7.575	128	1.695
	All types	7.158	512	1.735
Young Adults	Main axis A	7.036	128	1.504
	Sub-axis B	6.150	128	2.012
	Main axis C	5.308	128	1.421
	Sub-axis D	6.853	128	1.704
	All types	6.337	512	1.804
Adults	Main axis A	7.559	128	1.512
	Sub-axis B	6.230	128	1.931
	Main axis C	5.387	128	1.438
	Sub-axis D	6.970	128	1.689
	All types	6.542	512	1.834
Total	Main axis A	7.516	384	1.497
	Sub-axis B	6.491	384	1.964
	Main axis C	5.568	384	1.457
	Sub-axis D	7.132	384	1.721

Table 3. Significance of the Difference Between the Means Estimated with ANOVA for Landscape Types (Source: Authors)

Landscape type	F	Sig.	Compared groups		Mean difference	Sig.
			(I)	(J)	(I-J)	
Main axis A	13.773	.000	Children	Young adults	.91728*	.000
			Children	Adults	.69279*	.000
			Young adults	Adults	-.22449	.219
Sub-axis B	9.486	.000	Children	Young adults	.94359*	.000
			Children	Adults	.86420*	.000
			Young adults	Adults	-.07939	.741
Main axis C	9.322	.000	Children	Young adults	.70273*	.000
			Children	Adults	.62399*	.001
			Young adults	Adults	-.07874	.659
Sub-axis D	6.687	.001	Children	Young adults	.72250*	.001
			Children	Adults	.60562*	.005
			Young adults	Adults	-.11688	.582

According to the F test results, the mean differences for all landscape types are significant. Multiple comparisons results show that there is no significant difference between young adults and adults in all axes, which means they have almost the same visual preferences toward these landscape types. The result is opposite between children and young adults, and children and adults, which indicates different attitudes of children toward landscape aesthetic perception. To investigate the difference between the mean score of landscape components, an ANOVA test was used for the photomontages. According to the F test results in Table 4, the difference is significant in all landscape types ($P < .01$). In multiple comparisons between groups of interviewees, the difference is only significant between children and adults ($P < .05$) in all photos, which means they have different preferences in landscape aesthetics perception in the Delgosha garden.

Also, the multiple comparison test shows that there is no significant difference between children and young adults for photos A2, B2, B6, C2, and D2 ($P > .05$). In these photos (except B6), all Persian garden's physical elements are present, but the main axis is eliminated and replaced with vegetation. In B6, both axis and pavilion are eliminated, but there is an old single tree at the end of the axis, which seems to be a replacement for the pavilion in overall appearance. According to the mean differences for A and D in this group (mean difference A = $-.25000$, Sig = $.004$, mean difference D = $-.48438$, Sig = $.000$) which means that young adults have higher mean scores than the children, so it seems that young adults' visual preference for a complete, intact, and original pattern of Persian garden is more than children.

The result of the statistical test shows no significant difference between young adults and adults (For A, A3, A5, B3, B5, C3, D, D3, D5, $P > .05$), which means that these two groups have the same visual preferences in most parts. Among these photos, A and D are original photos without being changed by software, and both have Persian garden physical elements in the right order. In main axis B, there is a tree in front of the pavilion, and sub-axis C has no water in the main axis. So, it seems that young adults and adults have similar aesthetic preferences, and both agree on the original pattern of the Persian garden. In A3, B3, C3, D3, the pavilion is absent, and in A5, B5, D5, the pavilion and water together are eliminated, which led to lower scores for young adults and adults. This result shows the importance of the pavilion and water for these two groups of interviewees. Also, it seems that adults gave higher scores than young adults in most cases, but there are some exceptions, for example, young adults have higher mean scores for A2, B2, C2,

and D2, in which the main axis is eliminated. This means that the main axis is more important to adults than the younger ones, and young adults prefer much vegetation along with water and pavilion rather than the main axis and pathway.

The Effect of Landscape Elements on Visual Quality

To identify the effect of individual main landscape elements in the Delgosha garden, as mentioned before, some images were obtained using photomontage, and the effect of physical elements elimination was analyzed. As shown in Table 5, the effect of the considered elements varies depending on the context and the characteristics of the interviewees. In the children group, the difference between A-A3, A-A5, B-B3, D-D3, and D-D5 is not significant ($P > .05$). This means that the presence or absence of pavilion and water (in all views except C) doesn't matter to the children. Also, according to the multiple comparison tests result, it can be concluded that the elimination of main physical elements of the garden has improved the landscape preferences for children. This result may come from the children's tendency to greenness, because in some photomontages, the elimination of physical elements was replaced by vegetation, and most of them believed that the elimination of water from the main axis prepared both a more open area for playing and a safe space. For young adults, the difference is significant in all groups ($P > 0.05$), which means that all the physical elements in the Delgosha garden matter to this group. Also, the presence of pavilion has improved the visual quality for young adults (mean difference: A-A3 = 1.24219 , B-B3 = 1.14063 , C-C3 = $.070536$, D-D3 = $.50781$). Moreover, like the children group, the mean difference value is negative in comparing A-A2, B-B2, and D-D2, which means that the elimination of axis has improved the landscape aesthetics for this group. Also, the mean difference between C-C2 shows that the presence of water beside vegetation (which is substituted for axis in the photomontage) is of priority for young adults in landscape visual assessments, rather than vegetation alone. According to the results, it seems that adults are in full agreement with the original pattern of the garden, as the difference is significant in all photos ($P < .05$), and there is no negative mean difference value. Like the young ones, the pavilion has great importance in improving the landscape aesthetic for this group, but unlike them, adults cared more about the axis.

Table 4. Significance of the Difference between the Means Estimated with the Analysis of Variance for Photos (Source: Authors)

Photo	ANOVA test		Multiple Comparisons					
	F	Sig.	Children- Young adults		Children-Adults		Young adults-Adults	
			Mean Difference	Sig.	Mean Difference	Sig.	Mean Difference	Sig.
A	10.651	.000	-.25000*	.004	-.39062	.000	-.14062	.102
A1	10.822	.000	.39062*	.000	.21094*	.013	-.17969*	.033
A2	9.264	.000	.11719	.180	.36719*	.000	.25000*	.004
A3	8.830	.000	.42969*	.000	.39844	.001	-.03125	.784
A4	20.860	.000	.43750*	.000	.73438*	.000	.29688*	.010
A5	9.226	.000	.38281*	.011	.64062*	.000	.25781	.087
A6	17.333	.000	.42969*	.000	.67188*	.000	.24219*	.037
B	11.433	.000	.32812*	.016	-.32031*	.019	-.64844*	.000
B1	10.249	.000	.60156*	.000	.29688*	.026	-.30469*	.022
B2	6.374	.002	.10156	.256	.31250*	.001	.21094*	.019
B3	8.219	.000	.44531*	.000	.41406*	.001	-.03125	.799
B4	13.369	.000	.28125*	.028	.65625*	.000	.37500*	.003
B5	8.836	.000	.39062*	.000	.27344*	.004	-.11719	.220
B6	10.081	.000	.07812	.397	.39062*	.000	.31250*	.001
C	16.087	.000	.88281*	.000	.36719*	.019	-.51562*	.001
C2	6.890	.001	.03125	.841	.51562*	.001	.48438*	.002
C3	10.128	.000	.41406*	.000	.23438*	.011	-.17969	.052
D	22.998	.000	-.48438*	.000	-.58594*	.000	-.10156	.272
D1	15.018	.000	.68750*	.000	.35938*	.004	-.32812*	.009
D2	15.623	.000	.07812	.402	.48438*	.000	.40625*	.000
D3	10.673	.000	.55469*	.000	.35938*	.003	-.19531	.110
D4	13.322	.000	.39844*	.004	.71094*	.000	.31250*	.024
D5	8.715	.000	.44531*	.000	.41406*	.001	-.03125	.793
D6	12.450	.000	.25000*	.006	.45312*	.000	.20312*	.026

Table 5. Paired Sample t-test: Comparison of the Evaluation of the Landscape in the Delgosha Garden (Source: Authors)

Absent elements	Image compared	Children			Young adults			Adults		
		Mean difference	t	Sig	Mean difference	t	Sig	Mean difference	t	Sig
Water	A-A1	-.96094	-7.160	.000	.32813	4.559	.000	.53125	6.462	.000
Axis	A-A2	-.85156	-6.581	.000	-.23438	-3.598	.000	.37500	4.601	.000
Pavilion	A-A3	-.04688	-.333	.740	1.24219	10.594	.000	1.34375	11.580	.000
Water, Axis	A-A4	-1.03906	-8.111	.000	.25000	3.564	.001	.35156	4.801	.000
Water, Pavilion	A-A5	-.10165	-.608	.544	1.18750	9.663	.000	1.28906	9.960	.000
Axis, Pavilion	A-A6	-.57031	-3.723	.000	.71875	6.356	.000	.82031	6.767	.000
Water	B-B1	-.64844	-4.657	.000	.69531	6.551	.000	.92969	9.135	.000
Axis	B-B2	-1.17188	-9.681	.000	-.23438	-3.281	.001	.32813	3.460	.001
Pavilion	B-B3	-.20313	-1.489	.139	1.14063	12.588	.000	1.37500	15.743	.000
Water, Axis	B-B4	-1.10938	-9.526	.000	.23438	3.066	.003	.46875	6.605	.000
Water, Pavilion	B-B5	-1.11719	-9.449	.000	.22656	2.654	.009	.46094	6.134	.000
Axis, Pavilion	B-B6	-1.12500	-8.930	.000	.21875	2.711	.008	.45313	5.566	.000
Axis	C-C2	-.87500	-7.811	.000	.61607	5.877	.000	.64063	5.130	.000
Pavilion	C-C3	-.85156	-7.915	.000	.70536	6.433	.000	.51563	3.619	.000
Water	D-D1	-.33594	-3.402	.001	.38281	4.036	.000	.69531	7.627	.000
Axis	D-D2	-.53125	-5.107	.000	-.25000	-2.934	.004	.25000	2.552	.012
Pavilion	D-D3	.04688	.391	.697	.50781	4.625	.000	.63281	6.018	.000
Water, Axis	D-D4	-.48438	-4.629	.000	.38281	4.415	.000	.28906	3.204	.002
Water, Pavilion	D-D5	-.19531	-1.797	.075	.35938	3.996	.000	.48438	5.296	.000
Axis, Pavilion	D-D6	-.47656	-4.866	.000	.31250	2.941	.004	.43750	4.118	.000

Modelling the Scenic Value of the Landscape

“The effect of an element on landscape perception depends both on its characteristics and on its visibility. If an element occupies a large part of the view, its impact will be larger than if it occupies only a small part” (Tempesta, 2010; p. 268). The impact on landscape aesthetics (positive or negative) of any element depends on the percentage of the view that the element occupies. To verify the effect of each element on visual quality of landscape, “ordinary least square method” were used and models were estimated in which the dependent variable was the score and the independent variables were the percentage of view occupied by the following physical elements of the garden: pavilion at the end of the axis, water pound in the middle of the axis, axis or the main pathway of the garden, and vegetation or green elements which in this case are trees and bushes (although the planting and vegetation were not assessed directly in previous tests and were not eliminated in photomontage due to its obvious effect, but here the presence of this agent is going to be investigated among the groups). In this treatment of the data, the dependent variable of the models is not the average scores of each landscape, but all the scores given by the interviewees. The percentage of the view of each element is measured and calculated

precisely in Adobe Photoshop software. The “Adjusted R square” amounts in the regression model (Table 6) for Children: R^2 -adjusted =0.453; for Young Adults: R^2 -adjusted =0.188; and for Adults: R^2 -adjusted = 0.285. All the independent variables are significant ($P < 0.05$). The independent variable that worsens the landscape aesthetics in the Delgosha garden for the children group is the percentage of view occupied by the water pond in the main axis, while in young adults and adults, the result is opposite. This may be the children’s tendency for open spaces to play, which the water pond elimination in the middle of the main axis will provide them with the opportunity. Three independent variables that improve the landscape visual quality in the garden for all the groups are: the presence of the pavilion, the main axis, and the percentage of the view occupied by vegetation and green elements. The Standardized Coefficients of the models highlight the effect of greenness, which is rated higher by the children and young adults, but it is not by the adults; for them, the pavilion has the highest rate. Also, it shows the same effect of axis, which is rated in second place by the adults and children. According to the models, it seems that water has the least effect on visual qualities for the adults and young adults.

Table 6. Regression Models Predicting Scenic Value (Source: Authors)

Group	Landscape Element	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error			
Children	Pavilion	141.643	62.654	.160	2.261	.026
	Axis	140.028	31.800	.348	4.403	.000
	Water	-183.499	87.542	-.185	-2.096	.038
	Green	124.683	25.017	.377	4.984	.000
Young Adults	Pavilion	262.569	43.364	.511	6.055	.000
	Axis	408.962	65.672	.447	6.227	.000
	Water	400.105	79.627	.360	5.025	.000
	Green	191.397	28.045	.550	6.825	.000
Adults	Pavilion	274.638	70.155	.311	3.915	.000
	Axis	123.513	40.004	.273	3.088	.002
	Water	230.428	89.144	.211	2.585	.011
	Green	80.144	29.985	.223	2.673	.009

Children: $n=128$, $R^2=.470$, R^2 -adjusted=.453, $F=27.302$, $Sig.=.000$; Young Adults: $n=128$, $R^2=.423$, R^2 -adjusted=.404, $F=22.720$, $Sig.=.000$; Adults: $n=128$, $R^2=.308$, R^2 -adjusted=.285, $F=13.778$, $Sig.=.000$.

Pavilion = % of a view occupied by the traditional building at the end of the axis; Axis = % of a view occupied by movement axis (pathway); Water = % of a view occupied by water pounds in axis; Green = % of a view occupied by vegetation and planting (trees and bushes) alongside the axis.

DISCUSSION

The present study highlights some aspects of landscape perception in the Persian garden that have rarely been explored from this perspective. Discussing Delgosha garden's physical elements, it is realized that the effect of each element is different for the groups of interviewees. By assessing the percentage of the view of that each element occupies, it was determined that the presence of some landscape elements improves or reduces the visual quality for the groups of interviewees: pavilion, vegetation, and main axis considerably improve the visual quality of the landscape for all groups, while water reduce it for children and has less effect for others. Furthermore, vegetation has the most effect in increasing the visual quality of the landscape for children and young adults, and pavilion plays the same role for adults.

Comparing the groups of interviewees, the results show that for the main landscapes of the garden (photos A, B, C, D), a shared value system exists among the adults and young adults, while the children express different points of view. Adults and young adults also have the same opinion about some of the physical elements' eliminations: both ascribe a great deal of importance to the pavilion and water, and prefer the original pattern of the Persian garden. The adults care about axis more than the young adults, and young adults prefer more vegetation instead of axis, if accompanied by water and a pavilion. It seems that the children agree with the young adults about the main axis replacement with vegetation, but the young adults prefer the original pattern of Persian garden more than the children. According to the comparisons, eliminating the physical elements of the Delgosha garden causes a completely different aesthetic perception for the adults and children, and they have less in common according to statistical tests.

Overall, it seems that the preferences of the three groups of interviewees are hardly homogeneous for the garden's elements for several probable reasons. Adults give the same value to the main landscapes with original and traditional patterns of Persian garden (photos A, B, C, D), and the photomontages including the pavilion and axis. This attitude might have been rooted in a functional approach to the landscape. Coeterier (1996) defines this component of perception as "use". Most of the adults have spent their childhood leisure time in Delgosha garden with their parents, or friends, walking or playing in the main and sub axes of the garden, and using the various options. The adults older than 46 remember the former function of the garden as a place for holding cultural events such as the festival of arts (1967-1977), and the others consider the garden as an urban park. Despite their

functional approach toward the garden, the adults also put emphasis on the original pattern of the Persian garden due to their memories, knowledge, and cultural beliefs.

The young adults' perception seems to be more complex than others. They mostly have critical views and, as Tempesta (2010) believed, young adults perceive the garden more as the arrangement of separate physical elements than a coherent and united human-built landscape, and consequently, they have no functional vision. Although young adults pay special attention to the original pattern of the Persian garden, they prefer vegetation in the main axis without considering its function as a pathway. They also care about the pavilion, but if it is replaced with some vegetation (such as the single tree in photo B6), they would have the same perception they had of the main one (photo B), regardless of the pavilion's historical and cultural importance. This way of perceiving might be the result of the cultural departure of the new generation from its origins and roots caused by modernity, or underestimating the importance of education about cultural-historical at school and university, or simply just because they do not communicate with the garden like the adults, maybe due to the lack of any memorable event that is held in the past few decades.

The children's preferences for the garden's landscape are close to those of the young adults in some cases, but they significantly differ from the aesthetic perception of the adults. Francis (1988) has discussed this issue in his research and believed that "while adults are interested in beauty of landscape, children think whether the landscape area is fun or not" (Francis, 1988, p. 73). For children, the most important physical components of the garden are vegetation and axis without water, which suggests that children's priorities are naturalness, environmental opportunity for playing, and safety. These findings are consistent with Gobster's (1993) studies, which indicate that natural landscapes are preferred by children as long as they do not include threatening elements. Even though many studies have proved that plants density in a landscape would increase sense of fear and unsafety in children (Jorgensen et al., 2002; Kuo et al., 1998; Shaffer & Anderson, 1985), but the unique arrangement of physical systems in Delgosha garden has created a transparent and visible space which provides safety for the children and increases their aesthetics preferences. Also, the children's reluctance to water presence in the main axis is in contradiction with the studies of Zube et al. (1983) and Malinowski and Thurber (1996), who emphasize that water is a very effective feature in landscape preferences of children. This might have two reasons:

1-The presence of water in the middle of the main axis has decreased the playing area, and 2-They feel unsafe when playing or running next to the waterway or pool because of the possible risk of falling into it. Considering the different preferences of the interviewees toward the physical elements of Delgosha garden, the results of this research are consistent with the hypothesis that both biological (innate) and cultural (learned) components play a role in landscape aesthetics perception (Bourassa, 1990).

CONCLUSION

This research investigated the landscape aesthetics' perception in the Persian garden, with the Delgosha garden as a case study. To have a thorough evaluation, a mixed-method approach was adopted to measure both users' visual preferences for the garden and the importance of the garden's physical elements on its aesthetic perception. Three different analytical approaches were used to determine the most-preferred landscapes and which elements improve aesthetic value. The findings of this research are particularly useful for understanding how landscape perception varies in different generations and identifying the most preferred physical elements in aesthetic perception for each group. This becomes very important when the long-term effects are considered in landscape policy.

This re-evaluation of a historic garden intends to find some practical design guidelines for future gardens and landscapes. It can be concluded from the results that for certain physical elements of the garden, a shared value system exists among adults, young adults, and children. The landscape with a high degree of naturalness, when it is safe and preferable to play, is attractive for children. So, if landscape architects intend to get inspiration from the Persian garden to design for children, they might need to make some changes to the original pattern, for example, creating safer green spaces without water in the main path that allows children to jump around freely.

In addition, the landscape with historical buildings and straight axes is more coherent and has the highest degree of importance, mostly for adults, and then young adults. So, minor changes might be needed in the original garden design for these two groups, for example, preserving the geometric structure of traditional gardens beside restoring and renovating a pavilion, if there is any on the site or building a symbolic one, could be suggested for adults. However, according to the results, it can be less strict for young adults. The preferences expressed by these two groups seem to highlight the importance of learning and the socialization process in the formation of aesthetic values.

Persian gardens are part of Iranian cultural heritage and must be preserved for future generations. Considering the results of the research, it is possible to suppose that these values could be transmitted to the new generations through relevant training and educational programs, which can help them understand their importance. It is necessary to ratify a landscape convention in Asian countries like the European ones, to commit them to "increase awareness among the civil society, private organizations, and public authorities" of the value of the Persian garden, and the role of its physical elements in landscape aesthetic perception. So, it seems that by developing a targeted long-term plan including educational programs, interventions, protection, and distribution of grants, it would be possible to preserve Persian gardens in Iran. Also, by analyzing and assessing Persian garden elements and the way they are perceived by people, landscape architects can develop a design guideline for today's urban landscapes, where the growth of modernity has distanced people from the traditional world.

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