Assessing the Perception of Fixed Color Scape in Urban Spaces

Case Study: Imam Hussein Square in Tehran

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Abstract | Color is an important element used in urban landscaping can highly affect the enhancement of the urban identity. Colorful landscape planning of a city, as a branch of the environmental psychology, follows, like colorful palette planning in the interior decoration of a building. Therefor certain specific rules and principles that have been neglected and not attended to appropriately. This research aims at identifying and evaluating citizens' perception and their color preferences in the urban environment through their own participation and, therefore, effort has been made to analyze such preferences in a public urban environment (a section of Imam Hossein Square as an example) through the VEP (Visitor Employed Photography) method that obtains people's opinions about their perceptions of the colorful landscapes. For this purpose, the evaluation variables were extracted and the related pictorial questionnaires were designed. The sample of this research, determined through the cluster sampling method, included three groups of residents, workers, and pedestrians. The qualitative and quantitative analyses were carried out using the SPSS and Image Color Analyzer and the results were incorporated in the colorful landscape planning of the research site to reflect the citizens' color preferences. Based on the conclusions derived, some suggestions are: (1) sequencing the urban spaces and perception of color combinations in each sequence using color analyzing software programs, (2) determining dominant colors in each sequence and the needs to add or reduce colors considering their harmony pattern, (3) determining the dominant role and performance of each urban space and the color palette fitting its function, (4) studying the city's prevailing climate and extracting the principles required for better perception using a colored landscape, (5) determining the dominating audience of each space and studying their perception of the colors' indicators, (6) obtaining the citizens' opinions and preferences to plan the colored landscape in each sequence, and (7) presenting the proposed improvement plan of the colored landscape based on the reflections of the citizens' preferences.

Keywords | Participation, VEP method, citizens' color preference, city's color scape.

Introduction | Colors are considered as one of the most influential elements in the urban landscape and their proper use in urban environments plays an important role in improving the mental state of individuals. Dr. Beer, a renowned Austrian psychologist who has conducted a lot of research on color, states that: "psychologically, one can rarely see anything as big as color, none of us can stand up to nature and not be instilled by its instincts and emotions. We all enjoy seeing and understanding colors". Human behavior is affected by receiving color, and these reactions are not only psychological or cognitive but may also have a physiological dimension. Therefore, color is, in the most complete sense,

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a psychophysiological phenomenon that occurs in the brain and psyche (Bakhtiari Fard, 2009, 10). The knowledge of studying and applying colors has been under investigation for many years. On the one hand, its direct target audience, people, are communicating with the end product every day i.e. urban spaces in a field such as urban development as a technique and art. In fact, the city, like the canvas of a painter, is a playground for urban artists. Therefore, studying the palette and urban color scape, citizens' perceptions and preferences, and the extent to which their views are included in the proposed plans and programs are among the main goals and concerns of this study. In fact, the boundary of interfering science in using colors in the urban landscape and citizens' preferences would be very complicated. This study aimed to identify the color preferences of the citizens through implementing a structured approach and to develop some strategies to improve the urban color scape based on citizens' preferences.

Theoretical concepts and foundations

First, it is worth noting that the main focus and orientation of this research is a branch of "environmental psychology". Environmental psychology emerged in the early 1960s. During 1970-1960, the first work of environmental psychology was to understand the effects of the physical and social environment on individuals. However, since the 1980s onwards, psychology has also been exploring the role of people in the environment. It is an interdisciplinary field that is closely related to architecture, landscape architecture, and urban design. On the other hand, the study of color as one of the main components of the urban landscape is directly related to the science of environmental psychology.

• **The nature of color and their classification**
We may all be able to see the waves of the sea, but in reality, colors are part of the electromagnetic energy which are visible to us and move in the form of waves. Therefore, the definition offered related to color in physics is different from that of art in color and the psychology of color is different from both (Bakhtiari Fard, 2009, 10). On the other hand, personal characteristics and beliefs have a significant influence on people's use of colors, whether to define social hierarchies or as symbolic concepts in the expression of mythological or religious beliefs (Etienne, 1981). However, the science of studying colors generally contains laws that these rules are tried to summarize here. Generally, the number of colors cannot be counted. (Shi Ji Wa, 1998, 21).

• **The difference between feeling and perception by emphasizing on color perception**
Generally, the complex process of knowing and understanding sensory information is called perception. In addition, perception is the process by which individuals

adjust and interpret their cognition of their environment and thereby give meaning to them. Perception can be very different from objective reality. Often people have different perceptions of the same thing. It can be said that people's behavior depends on the type of perception (not reality). In an another definition of perception in psychology and its difference with emotion, it is said that "humans become aware of the environment through their senses, and one's perception of the world is initially sensory, and this sensation can be perceived through sensory mechanisms such as the ear, eye, skin, etc., but perception involves a higher understanding of the interpretation of sensory information."(Aghamohammadian Sherbaf, 1996, 66). The truth is that feeling is higher than understanding, and thinkers consider it as the highest level of mental stabilization.

Humans obtain 80% of their information through their surroundings, and the color is part of their surroundings. Color perception generally depends on three factors: (A) the conditions and environment in which the color is seen, (B) the surface characteristics of the reflecting object, such as its texture and ability to absorb or reflect light, (C) Individual abilities for color perception (Bakhtiari Fard, 2009, 95). So far, psychologists have conducted a great deal of studies on the influence of color and light on our perceptions of space and time (lightness and heaviness), temperature (warmth and coldness), distance (distance and proximity), and dimensions (bigness and smallness). Even the scale of time varies in the spaces with different colors. For example, warm colors feel closer distance and tighter, and cold colors are the opposite. In fact, one cannot say for sure that one color has just one psychological effect on all people.

Another discussion of color perception goes back to symbolism. In fact, some colors are the symbols of thought. For example, in the discussion of culture and beliefs, there are things like black in our culture for mourning or green for spirituality as well as the meanings of colors in the flags of countries. Similarly, using color in political movements, such as the color red for communists, is another example of the cultural use of colors.

• **Thermal perception in affecting the color spectrum and reactions of individuals**
The psychological aspects of color perception even influence the assessment of a person's thermal comfort and differentiate thermal perception from a thermal feeling. For example, Rohles (1980) reported about a closed space in 1980 that adding wood and carpet plates to a room, without altering its thermal parameters, has made residents feel warmer, emphasizing the high impact of psychological aspects on the assessment of thermal comfort. In addition, there are two categories of hot and cold colors in classifying colors that can be very effective

in inducing a sense of heat and cold in the urban landscape (especially in extreme climates). Basically, warm colors are seen earlier than cold ones, so warm color combinations are more appropriate for classifications. Further, the combination of warm and somewhat bright colors is more appropriate for a visual welcome (Bakhtiari Fard, 2009, 71). Here is a brief introduction to these two categories:

Warm colors: Red, yellow, orange, pink, brown and wine are called warm colors. In fact, the wavelength of red light is very close to ultraviolet radiation, which is the source of heat transfer. The warm colors are aggressive and catchy. Exiting warm colors in the workplace make the momentum faster and pull the eyes on the poster.

Cold Colors: The green to purple spectrum, which includes blue and gray shades, is known as cold colors. These colors have the same cooling effect. The effect of these colors is the opposite of the effect of warm colors. It slows down the body's activity and metabolism and is used in the hospital for the relief of the mentally ill and sometimes evokes a sense of cleanliness (Shi Ji Wa, 1998, 30).

Therefore, the conscious use of warm and cold colors in moderating climates can benefit the perception of people in urban spaces. For example, cold colors are used in a warm climate and warm colors are used in a cold climate in the form of urban furniture, flooring, urban views, decorations and extensions and the like. Here is an example of such an approach in Fig. 1, for example, shows an office in St. Petersburg, Russia, whose activity is to monitor their products and barcodes. The red color used to design the building's barcodes delivers a sense of warning to the audience. In addition, the red color in the cold and often snowy climate of Russia is quite obvious (use of cold and warm contrast).

Another example (Fig. 2), which refers to using cold colors in warm climates, is the design of a bus stop in the UAE, which uses cool colors in and around the station to induce coolness.

• The concept of urban color scape and the factors influencing its formation

The urban landscape is perceptible by human senses due to its concrete and tangible nature (albeit with its subjective nature). The basic elements of the landscape can be related to concepts such as light, color, time, and motion (Lancaster, 1996, 23). The most important of the five senses in understanding the urban landscape is the sense of sight. The gradual change of the urban landscape affects how we perceive it. In addition, this perception depends on the type of movement, whether on foot or on the ride. Various heterogeneous and uneven elements contribute to environmental disturbances. One of the most important of these elements, which is rarely explicitly addressed, is color. Color, unlike form, volume, facade, or flooring, is hidden in a layer, and many designers of

space, city or even building are less concerned with its psychological effects (Husseinion, 2001). In fact, in this context, the urban designer has the mandate to work on a 3D landscape that is immense and ever-evolving. The theory of color applies to the city on a wider scale and aims to create harmony in places that are not harmonious. However, using urban color is different from using color in painting. The color quality varies from city to city, season to season and morning to evening. Thus, color coordination laws about the city are examined and applied from different perspectives (Mahmoudi & Shakibamenesh, 2005, 111). Just as home furnishings and residential environments need to be color-coordinated, the city's constituents will create a relaxed atmosphere for citizens if they adhere to the principles of color combination and coordination. In urban environments, color can be seen everywhere, on the body and facade of buildings, roofing, flooring, urban furniture, green

Fig. 1. Building design based on its performance (monitoring and barcode) and using warm colors in the cold and cloudy Russian climate. Source: www.apadanaart.com/fa/article, 2015

Fig. 2. Bus station with cold colors.
Source: www.apadanaart.com/fa/article, 2015

space, cars, cities' sky, and people's dressing. In our society, for example, dark and opaque colors are the prevailing colors that definitely make our cities different from the cities whose people tend to be happy and vibrant. In addition, colors are not only important to beautify the world around us, but they also have strong emotional and psychological effects on individuals. Colors have different psychological interpretations, and therefore they are important instruments for directing and inducing specific mental states to individuals and communities. Dark and heterogeneous spaces result in depression and unintended psychological stresses that people themselves are not aware of the real causes, while the appropriate use of color in space can help reduce fatigue and eye arousal (ibid.). After a test conducted on colors, Max Locher found that unbearable environmental stresses and inequalities lead to inappropriate behavior which can affect one's personality. However, these effects are not necessarily permanent and, if detected in a timely manner, can create a favorable situation by changing the color of the environment and treating the unbalanced personality, thereby destroying personality anomalies (Loucher, 1991, 126). Therefore, cities today need to formulate a holistic approach to the problem of color so that they can be designed and organized alongside other urban color issues. Urban color scape i.e. the relation of the urban landscape to color is more than just an aesthetic symbol. In fact, color in the landscape is part of the conditions under which one lives and gains experience (Beigi, 2010, 52).

Effective urban elements in shaping the urban color scape

City is a complex entity that consists of many components. In general, the constituent elements of each city can be divided into two categories of fixed elements and urban moving elements. Each urban element, whether fixed or mobile are part of the urban colorful landscape. These elements due to their specific coloring have special urban function, from their wider social and recreational applications to their role in cleaning the environment and creating a sense of identity. Therefore the color combination of these elements is very effective in inducing a specific color palette to the city. Table 1 lists the effective physical and non-physical elements in the city's color scape which will be described in detail below:

• **Colors and urban animated elements**

- **Citizens**

Citizens themselves can be considered as moving elements that influence the urban color scape. The type and color of citizens' coverage of society are influenced by a variety of factors, ranging from political-governmental to religious-ideological, customary-socio-cultural, as well as seasonal and climatic influences. Therefore, because the life of a city depends on the presence of people in its urban spaces, this constant presence of citizens makes the prevailing color of their clothing influential in the composition of the urban Color Scape. For example, most people's outfit color is in the dark and opaque colors in the colder seasons of the year, and vice versa, citizens more use colored and light outfit in warmer seasons, such as spring and summer. However, part of the reason people choose specific colors of clothing comes from their ideological and customary issues which can stem from people's moods and also affect their psyche. For example, we always see the presence of colored people in urban spaces in European countries. But in a country like Iran, the effects of the factors mentioned above can be clearly seen in the color of people's outfit. Because it is not customary to use vibrant colors such as flashy red, yellow, and similar colors in urban spaces and people try to use darker colors like gray, brown, black and the like, and this is harder issue for women in society.

This, of course, applies to government policies to choose the governmental uniformed colors, such as employees and schools. Although, some changes in the color of schools (especially girls' schools) from elementary to high school were observed, which have not only affected the vitality of the student's mentality but also witnessed the arrival of thousands of color spots in urban spaces which creates a stunning and beautiful color variety in urban

Table 1. Effective elements in shaping urban color scape. Sources: Husseinion, 2001, 17.

Physical elements	Natural elements	Green vegetation	
		Soil and so on - khaki to brown, gray and so on	
		Urban Spaces	
	Artificial elements	Animated elements	Vehicles
			People and their clothes
		Fixed elements	Furniture
			Extensions
Non-physical elements		light	

spaces. In addition, it should be taken into consideration that Iran has a variety of climatic features, and other factors such as climate and geographical factors in each region also influence the choice of color. In the south of the country, for example, white color is the most popular and most used color, especially in men's clothing due to the intense heat and intensity of sunlight. In addition, living in the heart of nature full of vibrant color in some parts of the country has made the native and local clothing of these areas rich in color. However, it is the underlying problem is in the more developed cities, especially the metropolises of the country.

- Vehicles

Another moving element of the city which is very effective in colorizing cities is vehicles. In fact, color is considered as one of the most important external features that have the first and most direct effect on human vision. There are always different color combinations and different color spectra from the moving and putting together the vehicles in the city, each containing a specific semantic load. The frequency of choosing specific colors for cars in a community and a city are key factors in shaping the city's color palette.

It is generally dealt with two types of vehicles in the cities: personal and public vehicles. It is clear, therefore, that the type of ownership is decisive in the choice of vehicle's color. Therefore, it is more appropriate to classify and examine the effect of the color of vehicles on the urban color palette in terms of their ownership in two separate categories:

A) Public transport: the increasing population of cities and especially metropolis cities such as Tehran causes heavy traffic and use of personal cars. This event led to seeing more increasingly public vehicles, such as taxis, buses, trains, etc. Due to the growing demand for city-wide mobility, buses and taxis that are always moving around the city can be found anywhere. Therefore, they can be identified as influential elements in the color palette of cities which even in some cases form part of the urban identity. For example, black London taxis and red buses have become part of London's colorful identity and have become signs of recognition for the city of London. In London, women are also used to drive minicabs at night, with drivers wearing colorful clothes. In addition, yellow and green taxis and red-light buses in Iran (in cities like Tehran) form part of the urban color palette and are very effective in creating the color diversity of Tehran's urban landscape. In addition, today's advertising techniques have transformed cars, trains, trucks, buses and more into advertising means. Hence, the new range of colors for the commercial purposes of these advertisements is involved in the urban landscape.

B) Personal vehicles: Every personal vehicle is in the personal ownership of the person who has purchased it. Therefore, it is the individual who chooses and buys the color of their car according to their needs. The color spectrum of cars made on the world market today is vast and varied, and people in most parts of the world are welcoming and buying them.

Using personal cars in Iran is also on the rise, and it can be concluded that the increasing number of cars around the city has a significant impact on the overall mood and color of the city. However, the studies indicate that despite the color variations in the car catalog, the four most popular colors in Iran are white, jade, gray and beige. In this regard, some studies were conducted in Tehran, indicating that the color spectrum of moving cars in Tehran is a spectrum of neutral, cold and indifferent colors. A neutral spectrum with the appropriate combination of warm and cold colors can produce a sense of balance, but it reflects a sense of absurdity, nostalgia, indifference, sadness, and boredom due to the lack of color. However, the percentage of cars other than neutral colors which can have positive psychological effects is so small that overall the spectrum is very poor in terms of color diversity (Nikghadam & Ra'isi, 2010).

• Fixed urban elements

This article emphasizes the urban color scape, but it should be briefly stated that these elements in the color palette of cities include buildings, park furniture, and children's playground equipment, standard color traffic furniture, informational structures and urban advertising and environmental graphic design of the urban wall bodies. The urban building facades in the country generally include dead colors (including black and gray). However, urban furniture is included with vibrant and cheerful colors in the urban colorful landscape. In addition, using urban art to create urban decorations, extensions and graphics with vibrant color spectra can greatly improve the quality of urban color scape in the field of environmental graphics. It is worth noting that urban users are traveling around the city most of the time. Therefore, the type of movement and speed of the city in color design should be taken into consideration by decision-makers.

Research methodology

Due to the importance of the external validity of the measurements, research and "field experiments" are given priority in environmental psychology. In this regard, Barker (1968) considered the researchers who use "field observation" methods as translators The VEP technique was used in the process of collecting research data and field information due to the psychological nature and perception of the environment and considering the pedestrian orientation of Imam Hussein Square (low speed of viewer movement), which is summarized below. In addition, after comprehensive studies of theoretical

foundations and experiences, research variables were extracted to measure citizens' perception of color through the conceptualization method, and finally, a range is selected as a field study and the participatory approach was used measure these variables. Similarly, the strategies related to applying citizens' color preferences and planning the color palette of urban spaces based on their individual characteristics are presented.

• **VEP visual preference measurement technique**
The VEP method is a way of testing people's preferences which relies on people's evaluations. This evaluation is performed through measuring the "preferences of observers from the available samples" or "taking each person to introduce their own sample" (Zhang Ying, 2006). As a method, VEP identifies their preferences through distributing the camera among the respondents and then asking them to take pictures of the landscape which is relevant to the research purpose or to present the photos themselves to people and ask for their opinions. This method has been used successfully in understanding landscape aesthetics and the experience of outdoor entertaining and social planning.

The reasons for using VEP as a way of data collection can be explained as follows:

Photographs are the most common visual stimuli used in visual preference. To get people to immediately understand their surroundings, the photos taken by themselves are used.

Observers' responses are, in fact, preferable to the responses to natural landscapes when they experience the landscape in terms of face-to-face interviews, which may not include the right material or the questionnaire which may not be present at the moment.

• **Conceptualizing and extracting measurement variables**
The main variables affecting the color perception of citizens in urban spaces were extracted through the conceptualization process followed by studies of the examined foundations and experiences, which is given in the analysis section. Then, Imam Hussein Square in Tehran was selected as a field study pilot.

Field Studies in Imam Hossein Square, Tehran
• **Color Scape Sequence Analysis Studies**
The case studies of this research were conducted on a fixed color scape (not moving like people's outfit and vehicles'). For sample case the historical urban space in downtown of Tehran city was studied (Imam Hussein Square). Imam Hussein Square is considered as one of the most important urban squares of Tehran located on the east-west axis of the city. The urban design plan of Imam Hussein-Shohada and Intermediate Axis (17 Shahrivar Axis) was performed with an pedestrian-oriented approach since 2009. A huge

memorial was established at Imam Hussein Square, a place of gathering and mourning and rituals due to the name and function anticipated during Muharram. The field space is relatively large and is inhuman based on scale dimensions. In addition, these new elements are in some ways strange to people because they do not understand its symbolic meaning and the lack of proper perception of space resulted in discontent among users.

Color imaging was started with the help of photography to understand the current state of field studies. In the first part, some photographs taken from the study area were examined through specialized color analysis software and a visual questionnaire and in some cases a Likert spectrum was designed by VEP approach, which some questions were set corresponding to each research variables and were distributed among the citizens of the designated statistical population throughout the day.

In analyzing the software results, the color percentages of the sky are also taken into account. The software displays a three-columns, the percentage of color for each color in one column and the color for that percentage in the next column, and in the third column, the color code for each color is based on the hexadecimal standard. In order to simplify the analysis in the software, the case study are divided into two number of sequences. Some examples of key sequence analyses are presented in this paper.

As seen in the software output (Tables 2 and 3), except for sky blue color, the rest of the colors are in the neutral and so-called dead colors (gray, black, and dark brown), which do not have any particular effect on the perception of cold or heat in this space. This result is repeated in other sequences examined from this urban space.

• **Analyzing the visual questionnaires**
First, the alpha coefficients were calculated for all questions through the reliability analysis method in order to study the accuracy of the questionnaire questions and evaluate the appropriateness of the analysis tool. Since the alpha coefficient of the questions is greater than 0.6, the accuracy of the questions is at an acceptable level.

The statistical population of this study is divided into three categories: first, residents of the area, second, sellers and people in their area of work, and third, citizens crossing the area. Since the population of the statistical population was not known, the cluster sampling method was used and the sample size in this study was 100 people. These people have been selected based on the number of questions and covering all the constituent groups of the statistical population. After specifying the constituent clusters, the constituent populations of each cluster were surveyed through systematic random sampling.

In the next step, they were analyzed through qualitative analysis and SPSS software. The percentage of each applied color was extracted analyzing the amount and

composition of colors in the images by the software. However, because this article is focused on examining the perception of citizens' color perspectives in presenting intervention strategies in the color palette of the environment, a participatory approach was used to analyze the results of the visual questionnaires.

Table 2. Colors decomposition in the northern body of Imam Hossein Square in Tehran. Source: authors.

Color map regions	Proportional palette	HEX color	area	Closest color name
Source image		76746d#	29.6%	Dove gray (Gray)
		a7a292#	24.1%	Bud (Green)
		#e2faf6	13.5%	Solitude (Blue)
		#4e535	11.0%	Paco (Brown)
		#2c271c	7.8%	Wood Bark (Brown)
		#e1ddc5	6.7%	Teravertine (Gray)
		#675b39	3.2%	Verdigris(Green)
		#363938	3.2%	Shark (Gray)
		#a7876e	1.0%	Mongoose (Brown)

Table 3. Colors decomposition in the south side of Imam Hossein Square in Tehran. Source: authors.

Color map regions	Proportional palette	HEX color	area	Closest color name
		76746d#	29.6%	Hawkes blue (Blue)
		a7a292#	24.1%	chicago (Gray)
		#e2faf6	13.5%	Wood Bark (Brown)
		#4e535	11.0%	Arrow town (Gray)
		#2c271c	7.8%	Alice Blue (Blue)
		#e1ddc5	6.7%	Tallow (Brown)
		#675b39	3.2%	Aths (Special)
		#363938	3.2%	Gray chateau (Gray)
		#a7876e	1.0%	Clam (Brown)

Analyzing the results of field study

In this section, the analytical results of the studied variables related to citizens' perception of color perspective in the study area are summarized and Table 4 also shows the percentages for the variables 1 and 2:

• **Variable 1**

Identifying citizens 'color preferences (citizens' color preferences) in general (not in urban space): in this section, the citizens were asked, "Which color or colors do you like the most?" The results indicate that the most popular colors are green and blue, followed by white, orange, and red.

• **Variable 2**

Identifying prevailing colors from the perspective of citizens (the colors which attract more attention than colors in the majority): This variable was measured through two questions in the study area to identify the prevailing colors of the environment. First, people were asked about the prevailing color, and second, the prevailing color was asked by marking some images.

If you close your eyes for a moment and imagine this environment, what color would it be? The results of field studies in this section indicate that people's visualization of the study area tends to be dark, brown, gray and black. In addition, the analysis results of the available colors in the photos taken from the area through the software indicate this issue.

Name some of the colors most commonly used in this setting? This question is also designed to measure the prevailing colors of the environment in a different way, and here people are more mindful of the environment, whereas they get help from their memory in the previous question. In this section, most citizens have named black, gray, blue, green, red and brown. Black, gray, and brown colors, like the results of the previous question, are part of people's perception of the color palette of space, and other colors (blue, green, and red) are the ones which were used extensively in the extensions and the commercial shops around the square.

• **Variable 3**

Investigating the impact of available colors on ambient legibility: The above variable is measured by this question: "Can you use colors to find the address in this environment?" Based on the results, the majority of people (92%) cannot address or mark using color. This indicates the same color in the environment and indicates that there is very little color variation in the environment. In addition, the field itself is largely unreadable, and many elderly people unfamiliar with the environment have lost sight of the field.

• **Variable 4**

Determining the type of citizens' feelings about neutral dominant colors: Here the question was asked from citizens of the study population: "How do you feel about a space with monochromatic colors (monochromatic or colorless)?" There are four categories for measuring the type of emotions: a) anxiety, b) boredom, c) calm and d) excitement. The results indicate that most people feel tired (58%) and anxious (31%), with only 2% feeling emotional and 9% feeling relaxed.

Available studies have indicated that the prevailing colors in the minds of citizens were more gray and brown and people emphasized the lack of color diversity in the environment, one of the reasons for the heightened feeling about boredom and anxiety is the uniform color scape of the environment.

• **Variable 5**

Assessing the degree of relaxation, boredom, excitement or anxiety of colors in the sequences and the whole space: In this section, to measure the type of aroused emotion in individuals facing each field sequence (the field is divided into 5 sequences and the images corresponding to each sequence are measured in the questionnaire), the following question is shown to the interviewees with a picture: "How do you feel about the image you see in the mix of colors used in the environment?" The results indicate that in most cases, the feeling about excitement in citizens has been bothersome and anxious, indicating that the color of the environment does not correspond to the dimensions of the building, its performance and the features of its user.

The samples of the examined sequences is shown in Fig. 3 items A to E and the key map is shown in Fig. 4.

Table 4. Color percentage analysis of each studied variables. Source: authors.

Variable name	Variable 1, identifying citizens' color preferences (citizens' color preferences) in general (not in urban space)				
Color	Green	Blue	Red	White	Orange
Percentage	31	25	12	17	15

Variable name	Variable 2							
	Perception of prevailing color			The prevailing identified color					
Color	Brown	Gray	Black	Brown	Gray	Green	Red	Blue	Black
Percentage	41	48	11	34	33	10	10	6	7

A) sequence 1

B) sequence 2

C) sequence 3

D) sequence 4

E) sequence 5

Fig. 3. samples of the investigated sequences for measuring the type of aroused feeling in Imam Hussein Square in Tehran based on the key map. Source: author's archive.
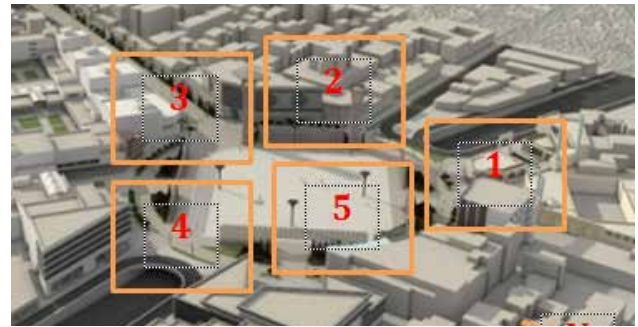

Fig. 4. Key map of sequences. Source: authors.

• **Variable 6**

Associating specific meanings the color perspective of the environment: This is an open-ended question asking people: "Does the color palette have any meanings for you? Like religious-spiritual or otherwise?" The results indicated that there was virtually no color of special significance in this space. In fact, about 86% responded that colors do not convey any meaning to them, 12% responded that a sense of contamination and dustiness is evoked, and only 2% expressed a spiritual sense.

Conclusion and suggestions

The extent to which the citizens' preferences are involved in presenting the color palette design of urban public spaces and understanding the relationship between the psychological principles of urban landscape color planning and citizens' perception of urban landscape colors are difficult. Therefore, this study aimed to evaluate the variables affecting citizens' perceptions in a public urban space as a pilot through participation-based methods, such as VEP and video questionnaire preparation.

As mentioned, although Imam Hussein square has undergone many changes as a result of the pedestrian intervention, it has not yet seen the prospect of color injections. Urban furniture, flooring, and even giant steel structures are dead and opaque in color, and ultimately induce a vivid, neutral color to citizens, which in some cases creates anxiety and fear. Even at night, the lighting does not improve much in this situation. However, this space is designed to create a spiritual environment because of its ritual function; the potential created by the use of turquoise and green colors in combination with the natural color of straw was borne out by the lack of academic or present-day urban design knowledge traditional urban spaces.

Neutral colored pallets in urban spaces can lead to citizens' depression, and the Imam Hussein Square in Tehran is a prime example reflecting its religious and governmental identity. On the other hand, our vast country, Iran has a very rich history and civilization which can contribute to the identity of our cities even in terms of color pattern.

Due to the prevailing climatic conditions of our country, most of refers to what are desert and arid lands, the presence of colored walls can compensate for the colorlessness of the natural vacuum and make the atmosphere lively in any season. In the case of Imam Hossein Square in Tehran, adding elements such as tiles, boards, urban furniture and changing colors and lighting of steel structures can enhance the existing neutral color palette. Ultimately it is the urban landscape designer who determines the color palette pattern of the environment based on the climatic, cultural and social characteristics, the prevailing function of each space and its dominant audience (based on age, gender, and culture). However, incorporating citizens' perceptions and preferences in many cases is not inconsistent with the relevant principles and sometimes results in synergies with the expected outcome.

Here are some key suggestions from this research to facilitate citizens' preferences in urban color scape planning:

Sequencing urban public spaces and capturing color combinations in each sequence through color analysis software.

Determining the dominant colors in each sequence and the need to add or subtract colors according to the color harmony pattern using complementary, contrasting, overlapping, or expanding colors.

Determining the prevailing role and function of any urban space (residential, educational, commercial, recreational, etc.) and the color palette appropriate to the dominant function.

Studies of the prevailing urban climate and using warm and cold colors to modify the climate through color perspective.

Determining the dominant audience of each space in terms of age, gender, and socio-cultural characteristics, and studying their perceptual characteristics of colors.

Applying colors which evoke the role of space with the cultural norms of the environment,

Finally, summarizing the above materials, qualitative and quantitative analysis of the colors used in each sequence and their harmony, and presenting a proposed color scape improvement plan based on reflecting citizens' color preferences in fixed and moving components of the urban landscape.

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