

Manifestation of Empty Space in Facades of Iranian Contemporary Architecture

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Abstract

With an emphasis on the invitation property, empty space is one of the basic concepts in the Islamic architecture of Iran. Thus the Iranian architects have always tried to utilize this concept in their works. This article is drawn from research on the recognition of quantitative and qualitative qualities and the notion of empty space in traditional Iranian architecture and the manifestation of these concepts in modern building facades. This article seeks to answer the key question whether the key elements of the empty space affect the invitation property of the facade? To answer this question, case study method and combinational solutions are used to collect data by library and field methods. Ten examples of modern architecture which had the ability of studying the concept of empty space were chosen from the works of fifties onwards. These works were studied in terms of the manifestation of empty space elements in them. Then a group of architecture students were used for specifying the invitation property. As a result most buildings which have a lot of empty spaces have the invitation property regardless of other empty space characteristics. Also the results showed that the concepts related to the motion are not highly effective in the invitation property of these works. The effects of homogeneity and axis orientation of empty space are more analyzable in the invitation property of these works.

Keywords: *empty space, contemporary Architecture, Façade, Islamic Architecture, invitation property*

1. Introduction

The architect's efforts have been always for the creation of desirable and beneficial spaces. To achieve these goals, understanding their behaviors within the space is very important [8]. Furniture, lighting, paint, performance, privacy, feelings, and generally all qualitative and quantitative aspects of human behavior within the space determine the scenario of this space [7]. Researchers have studied various aspects of human behavior using the behavioral science and there is valuable information that can be used by architects. In architecture literature, the empty space is used as an essential factor of design that includes a number of psychological, functional and environmental concepts. The proportion of empty space varies depending on the type of building. For example, this proportion in the facades of the office buildings typically has high levels while a holy place has a proportion with low levels. There are three major reasons as the importance of subject to search the necessity for the use of empty space: 1. exploring the relationship between the priorities of empty space to the filled space. 2. Determining the design quality of modern building facades such as transparency, opacity, being heavy and light which is totally related to the physical description of façades. 3. Discovering the value or range of values for the empty spaces in the modern building's façade. The use of empty space is a determining factor in the appropriateness of façade in modern buildings in sensitive context of city particularly in historical places. A solution for this issue is that there must be new designs with new proportions in urban contexts. For example the construction of a new accommodated view with the increase of the proportion of empty space and appropriateness is recommended in an urban place which transfers the sense of invitation. A number of architectural concepts such as proportion, hierarchy, rhythm, balance, contrast and ... are able to make a change one style of architecture to another style. Therefore when the changes of geometry value in the proportion of empty space to the filled space is so important, it will be quite reasonable to measure this proportion.

Therefore, this study aims to identify the concept of empty space in the traditional Persian architecture, reread its effect and explain its manifestation quality (invitation) in the modern architecture of Iran. Accordingly these questions can be answered: 1. what kind of empty space orientation has the highest priority? 2. What proportion of empty space to filled space in buildings' façades has the highest priority? 3. Can the values of empty space proportion be changed in the anticipation of priority in modern buildings' facades? In this regard, the following

hypotheses were defined: 1. determining the quality of empty space proportion to the filled space in facades makes them easier to be understood, designed and communicated with sensory values. 2. Studies have shown that there is a relationship between the empty space proportion to the filled space and the invitation property of facades.

2. Theoretical literature

2.2. The concept of space and its features

Space, the concept of space and its properties are the subjects of architecture. It is an available infinite source and does not have an architectural presence without the third dimension. Architecture has been always involved in the space lightning, space multi-timing, space cleanliness, space lightness and heaviness, space diversity, space multi-value, space richness and so on [5]. Any space which is part of a whole can be determined by a limited area which contains horizontal elements such as floor, roof, and vertical elements such is the bodies. In each space in addition to form, cultural factors, performance and its name make the main structure of the space and its user has certain significance. Its surrounding degree will vary depending on the element of privacy. Therefore it has a specific area in conjunction with other components and determines other elements such as scale or proportion, light, radiation and space needs [13]. Jorg Grutter separates two kinds of space called the mathematical space and perceptual space and introduces the mathematical space as a space with quantitative properties [3]. It can be found that the mathematical space is a space that exists in the outside world as a phenomenon and both quantitative and qualitative features. But perceptual space is a space that emerges in relation to human perception of mathematical space and loses its meaning without the relationship with human[9]. Quantitative and qualitative features of the space are dependent on the components and the relations of elements with each other. These factors are influenced by the following features: 1. Elements' dimensions. 2. The position of elements to each other, size, proportion, form. 3. Type of elements: material, surface, texture and color.

2.2. The concept of architectural spaces from the perspective of Islamic Philosophy

The concept of architectural spaces from the perspective of Islamic philosophy includes an abstract aspect and quantitative features in different levels of space with no association with human. It has a more important aspect in association with human which is called as visible space, the environment of human excellence. In this perspective, the architectural space must include the human architecture (Islamic view of man). Thus the mathematical space or the mathematical features of space is the only tool for making and achieving this space and its value can be achieved only in this introduction [11]. Table (1 and 2)

Table 1: Three approaches to the definition of architectural space and their characteristics

Types of space	characteristics
Spaces associated with human (perceptual space)	relative, polar, non-homogeneous and time function
Spaces non-associated with human (Scientific space)	Cartesian mathematical space, Euclidean non-polar and non-axial, homogeneous and homologous
	Non-Cartesian Mathematical space, non- Euclidean multi-polar and axial, non-homogeneous and without field qualitative features

Table 2: The effect of motion and the geometry of space on human

	Fixed point of view (C)	Moving point of view (D)
Fixed human (A)	Space and Geometry appropriate for emotional self-awareness	Space and Geometry appropriate for human thinking
Moving human (B)	Space and Geometry appropriate for Reflect human	Space and Geometry appropriate for travel in souls

2.3. Empty space in Islamic architecture

Empty space in Islamic architecture is a place for the presence of human in contrast with the modern architecture [11]. Empty space in the Islamic architecture is one of the most important direct benefits of monotheism metaphysical principle in art which has inherited from the Iranian spiritual architecture. Islamic art has always sought to create a space where the temporary nature of material objects is highlighted. But if the objects and elements are absolutely nothing, basically there will be no thing. In fact, in its entirety, it is the holder of ideational aspect of things such as the reflections and positive aspects and also the absolute truth. In the Islamic architecture, space has a negative sense. Space is not defined by a positive thing, but by the absence of corporeality or materiality. This is another aspect of empty space or the negative space. Negative space and positive form are equally essential. Space is synonymous with the absence of materiality. Thus the empty space, in art and in Islamic architecture, plays a positive role through clearing the material and revealing its mortal nature and also mixing the divine presence with material forms [4]. Thus the empty space is a supreme bed attached to the sensible world which is a guide toward the hidden truth in seventy thousand veils of light and darkness[2].



Fig 1: The use of empty space in the view of pre-Islamic palaces and temples. Firouz Abad Temple (Pirnia, 2007).

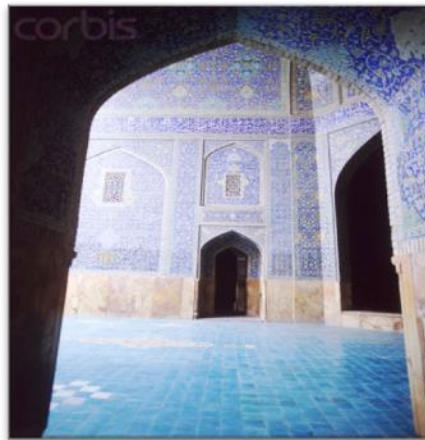


Fig 2: the emptiness of Islamic art indicates the sacred and divine ubiquity (Authors).



Fig 3: using porch and hall and creating transparency and invitation. Taba Tabaei's House. Kashan (Authors)

2.4. Façade and the concept of invitation in modern buildings

Facades are particularly important both in terms of urban landscapes and architecture. The beauty and combination of façade makes the architectural work valuable because we encounter the façade firstly through the visual organ and the vision element in the first place is the building's façade. Architects deal diversely with the problem of building facades and have the greatest impact on those who would not do something with the architecture inside the building [15] The entrance invitation is one of its main points, so that the entrance is located at the vision angle and shows its existence in one façade. Creating a concavity in the entrance has the greatest impact on viewers like the two hands that open to embrace someone. For this reason semi-cylindrical forms are used to create the sense of invitation, while a convex entrance acts it inversely and forces the person to pass it along. For example, if the form has the sentry of a concave mode set, this means that you can get help from the guardian; otherwise you feel that you have to pass it along. However, you should note that not all buildings need this invitation property and sometimes it does not specify a certain entrance. The person is not supposed to know where to enter the environment such as the protected areas. These entrances are typically unilateral, it means that the person enters from one side and exit from the other side [10].

3. Methodology

In this respect, the research literature has a few references. Some references emphasized the importance of balancing the empty space to the filled one with the use of oral expression. Some other references say that the proportion of the empty space to the filled one is used as a tool to convey some sensory values such as transparency in the facade. Researchers say even if the form of entrances, proportions and their orientation in new buildings are different from the historical forms, maintaining the same proportion of empty space will help the invitation property of the building. Studies have also shown that the proportion of the empty space to the filled one in modern buildings' facades can help the architects to convey emotions like invitation and repulsion. In this regard, previous studies have also reported four experimental works: The first one is the work of Stamps which reports the physical characteristics of priorities for residential facades. It uses the measurement of geometric properties to reduce ambiguity in the description of facades. In Stamps's work the proportion of empty space to the filled one was not calculated and a constant (0.13) was applied. The integration of the proportion of empty to the filled by the variable used by Stamps can give us better information [16]. The second one is the work of San that was about the effect of transparency / opacity of buildings' facades. Answers were related to transparency, openness and closeness. The stimuli presented by San were two categories: Totally transparent with too much proportions of the empty to the filled and fully opaque equal to the much less proportion of empty to the filled. It has been reported that the opacity of buildings is preferable to their transparency. This was the drawback of San's work that only showed two spectra of fully transparent and

opaque and there was no moderate mode[14]. The third one was the work of Imamoglu that reported the assessment of building on the complexity, desire and fondness. In his work, the plain white color designs of traditional and modern houses are described. Other variables include the increase of the proportion of empty to the filled that has caused the stability. The method was validated because the manipulation and understanding of complexity were highly interdependent [6]. The fourth one was the work of Akalin that reported the effect of building's complexity on the effectiveness of the priority. There were some changes for the dependant variable i.e. complexity that was classified in the two previous studies with structural Photographs [1].

A research method is the study of research problem for a community in a county like Iran. To narrow down the subject and for the better and more accurate analysis 10 cases were examined in the context of the project to have a background for future studies. The present paper is placed in the applied research in terms of the purpose. In this paper a descriptive-analytical method is used based on the library and field studies (open observation, questionnaire, and architectural drawings). For the analysis of questionnaires, the relationship between independent variables (quantitative and qualitative characteristics of space) and dependent variables (invitation property) is examined using the statistical techniques.

In this section, the concepts of motion in the case samples of Persian modern architecture are discussed. For this purpose, all kinds of space and the features derived from the previous studies in the buildings in question are marked in the related tables. Then in the case of using then concepts of the empty space, the building will be considered as the buildings which have more invitation properties than the buildings which have not used these concepts. Then some pictures of these buildings were shown to 50 students of architecture in Saveh Azad University. To assure that the results have sufficient accuracy and reliability, 50 female students and 50 male students were selected. Also 25 % of participants were the first-year students, 25 % of them were second-year students, 25 % of them were third-year students, and 25 % of them were fourth-year students. Participants were aged 19 to 26 years. To analyze the concept of invitation and the effect of empty space's elements on the Persian modern architecture, the statistical population consisted of all the great works of modern architecture in Iran during the 50s. Those works were named in specialized journals or academic papers. 10 works were randomly selected (the Museum of Contemporary Art, Cultural Center of Dezful, heritage building, Imam Sadegh University, Cinema Complex of Mellat Park, Negarestan Farhangsara, Niavaran Farhangsara, Sport Complex of Niavaran, Alghadir mosque, International library) and for each of them the following letter view was marked. Due to the size and capacity of the paper, two detailed examples (Museum of Contemporary Art and CULTURAL CENTER OF DEZFULE) are included in the text. However, the final conclusions are related to the ten analyzed works of Persian modern architecture.

4. Case Studies

Museum of Contemporary Art

In the outer capacity, encourages the repeated elements such as windward to move upward. Vertical motion in the entrance is located as the up and down visual communication. The figure is almost 40 percent by calculating the proportion of the empty space to the filled one. Small windows strengthen the horizontal axis as the windward.

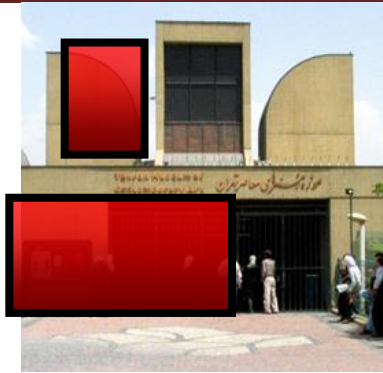


Fig 4: when the viewer is fixed and the point of view is moving, the accurate space and geometry is created for the human (Author)



Fig 5: all elements of the empty space communicate with each other and are homogeneous, back, front, left and right (Author).

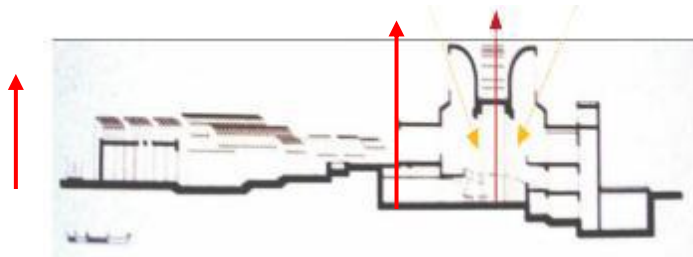


Fig 6: There is one axis in this set which is dependent on the standing position of the viewer ((re-drawn, author)

Table 3: Completed letter view for the elements of the empty space at the Museum of Contemporary Art

elements the empty space				
	The proportion of the empty space to the filled one	kind of motion	homogeneity	Axis orientation
features of these elements	40%	AD	•	•

CULTURAL CENTER OF DEZFULE

Structure of this design is based on a spiral path started with moving water from a square courtyard and achieving to an octagon yard in the depth of the earth by a rotation inside a transparent inverted cone, in order to

depict story of crossing man from the world to the paradise by this amphibology. Plan of the building has been obtained from processing an arabesque in three dimensions and four flying wind towers around this paradise courtyard amplify kind of looking to the sky.

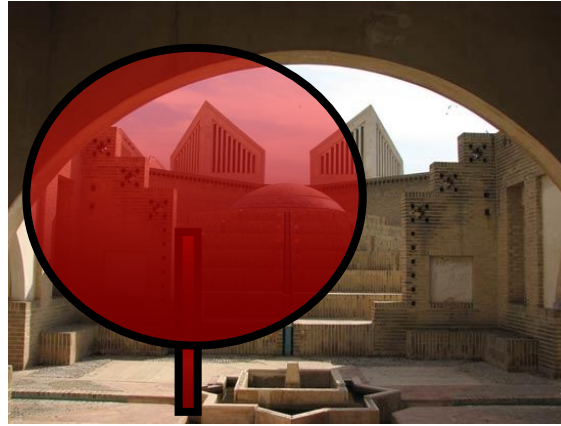


Fig 7: all elements of the empty space communicate with each other and are homogeneous, back, front, left and right (Authors).

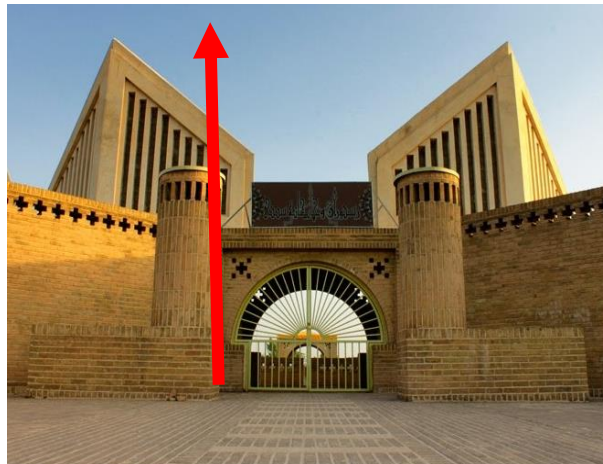


Fig 7: There is one axis in this set which is dependent on the standing position of the viewer ((re-drawn, authors)

Table 3: Completed letter view for the elements of the empty space at the Cultural Center Of Dezful

	elements the empty space			
	The proportion of the empty space to the filled one	kind of motion	homogeneity	Axis orientation
features of these elements	10%	AD	•	-

4. Discussions

The findings obtained from review of photos, diagrams and calculate the proportion of empty space to fill on the facade of the samples by students. The results are shown in the table below. Results have shown that the proportion of the empty space to the filled one is 40 % in 20 % of the mentioned buildings (the Museum of Contemporary Art and heritage building). This figure shows the emphasis to understand, design and communicate with its sense of values. In 50% of samples (the Museum of Contemporary Art, heritage building,

Niavaran Farhangsara, Alghadir mosque, International library) human and the point of view are moving (BD) and its shows the suitable space and geometry for travel in souls. In 50% of samples(the Museum of Contemporary Art, Cultural Center of Dezful, Imam Sadegh University, Niavaran Farhangsara, International library, homogeneity in the façade is obvious and the Axis Orientation shows the importance of frequency in these samples. 60 % of the frequency of Axis Orientation indicates this issue. With all the above interpretations the property of invitation is evident in 60% of the samples(the Museum of Contemporary Art, heritage building, Imam Sadegh University , Niavaran Farhangsara, Sport Complex of Niavaran, International library). There was no particular relationship between the invitation and the centrisism.

Table 4: Results of the analysis of case samples

Name of building	elements of the empty space				invitation
	Axis orientation	Homogeneity	Kind of movement	proportion of the empty space to the filled one%	
the Museum of Contemporary Art	•	•	BD	40	•
Cultural Center of Dezful	-	•	AD	10	•
heritage building	•	-	BD	40	-
Imam Sadegh University	•	•	AD	20	•
Cinema Complex of Mellat Park	-	-	AC	5	•
Negarestan Farhangsara	-	-	BC	10	•
Niavaran Farhangsara	•	•	BD	20	-
Sport Complex of Niavaran	•	-	AD	20	•
Alghadir mosque	-	-	BD	5	-
International library	•	•	BD	25	-

5. Conclusion

Architecture of the past, has presented a large and deep school to the today's architect. And the need to study this precious treasure is brighter and more visible every day. Therefore, the concepts of Islamic architecture such as the empty space can be used and adapted to make sense to the new spaces. The meaningful role of empty space and geometry, its elements and intelligent utilization of them are essential to enliven the facades of modern buildings. Results showed that the most buildings which have high proportion of the empty space to the filled one have the property of invitation without considering the other properties of the empty space. The results showed that the concepts related to the motion, have a less effect on the invitation property of these buildings. The effects of homogeneity and Axis orientation of the empty space can be further analyzed for the invitation property of these buildings.

References

- i. Akalin-Baskaya, A., & Yildirim, K. *Design of circulation axes in densely-used polyclinic waiting halls. Building and Environment* 2007, 42: 1743–1751.
- ii. Burckhardt, T. *Sacred Art (Principles and Methods)*. Tehran: Soroush Press, 2002.
- iii. Grutter, J. *Aesthetics in architecture*. (j. Pakzad, Trans.) Tehran: Shahid Beheshti University, 2007.
- iv. Haddadi, B. *Mental clarity and transparency in the empty interior. Architecture and Buildings*, 2007, 14, 39-42.

- v. Haeri, M. R. *Iran's role in the architectural space, Rehabilitation seven speech language structures.* Tehran: Office of Cultural Research, 2009.
- vi. Imamoglu, C. *Complexity, liking and familiarity: Architecture and non architecture Turkish students' assessment of traditional and modern house facades.* *Journal of Environmental Psychology*, 2000, 20 (1), 5-16.
- vii. Mahdavinejad, M., & Abedi, m. *Community-oriented landscape design for sustainability in architecture and planning.* *Procedia Engineering* ,2011, 21, 337-344.
- viii. Mahdavinejad, M., & Abedi, M. *Contemporization of Historic Monuments with Particular Reference to Contemporary Architecture and Design.* *International Journal of Basics and Applied Sciences*, 2013, 1 (3), 578-586.
- ix. Mahdavinejad, m., & Abedi, m. *Evaluation and Comparison of the Meaning and Concepts of Contemporary Urban Parks and Historic Gardens.* *International Journal of Modern Engineering Research*, 2012, 2 (6), 4743-4748.
- x. Nikjoo, m. *Entrance and lobby of the building.* Retrieved from <http://www.behprint.com>,2012
- xi. Noghrehkar, A. *Theoretical Basics of Architecture.* Tehran: Payam Noor University Press, 2010.
- xii. Pirnia, M. K. (1386). *Style of Iranian architecture.* Tehran: Soroush knowledge, 2007.
- xiii. Pour Deyhimi, S. *Factors affecting the perception of form and space.* *Architecture and Culture*, 1999, 19-28.
- xiv. Sen, D. Ö. *The effect of transparency-opacity concepts in building on the perception of facades.* *International Journal of Islamic Architecture* , 2011, 3 (1), 223-242.
- xv. Shateryan, R. *Understanding the architectural form and space.* Tehran: Toorang, 2007.
- xvi. Stamps, A. *Physical determinants of preferences for residential facades.* *Environment and Behavior* , 1999, 31 (6), 723-751.