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Reflection on the physics of light in the quality of the House's spaces (Case Study: Qajar era homes in Yazd)

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Abstract

Suitable utilization of daylight in architecture, in addition to meeting the physical and emotional needs of human increase the quality of living spaces. From this perspective, our country's rich architecture has valuable achievements and experiences, which requires recognizing and introducing it to the architectural community of Iran and the world. The present research intends to examine the various qualities made at the back of light entrances using descriptive-analytical method, field observation and study on library documents and obtain the factors contributed in creation of these qualities and take step to reuse these ideas in modern architecture.

Key words: *entrance, quality, house spaces.*

Introduction

House is a place for comfort, a place to meet comfort and a place to meet the physical and intellectual needs of individuals living in it. In the not too distant past, the house did not belong to a family with today's definition (father, mother, children), but belonged to the clan, i.e. a clan was headed by grandparents and other households, children, grandchildren and great grandchildren have lived in it. For this, the defined spaces are wider than the definitions presented for today's family. Home should be a place to visit, a place for fun and recreation, a space for children to play, and should have a room for a home server and clients. In Iran, according to a region's climate as well as the needs of each community, the house has indoor, open and semi-open spaces (Pileh Foroush, 2007, p. 15). Among surrounding spaces, the house is the most immediate environment associated with human; house affects human and also it is affected by human; it refers to the first place in which the man experiences the sense of belonging to space. All five senses permanently set over the house and accustomed to it in a short term (Feizi, 2010, p. 23). Without doubt, light is required to see and do the tasks like reading, writing, sewing and so on, but light determines the space through visual understanding (Without light, there won't be visual perception). Natural daylight has several features through which the space finds meaning, i.e. the features include form, color, texture and background of materials especially when emphasis has been put on them (Omid Azari, Arthur, 2012, p. 10). Natural sunlight is one of the factors that can play an effective role in quality of house spaces and gathering of family members if it is used properly. Modern housing due to numerous problems such as neighbor privacy, making two or three facets of the Earth and often designers' lack of awareness from effect of natural sunlight on man and his living space has not paid attention to this important aspect. Some house spaces due to bleak aspect and/

or lack of suitable ventilation are not suitable places, and often we witness that inattention to surrounding nature causes arrangement of house spaces next to each other.

Aims of research

In the present research, we seek to examine role and effect of natural light on man and human activities and the space in which he lives; the space diversity can raise in a house regarding the skylight whereby the spaces will be arranged next to each other with more favorable quality, so that their function will be more different than the concepts of the past. The aim of this research is to examine effect and role of natural light on body and mind of man of today and also examine role of natural sunlight on creation of cozy spaces for gathering of family members, mentioned that inattention to light can turn the house to a bleak place which affects the body and mind of family members who seek to find a way to escape from their living area. As a result, we seek to have the best place for favorable life in nature in surrounding that place despite all the limitations in establishment of suitable house and design new spaces with new and favorable qualities for Yazd houses regarding the significance given to this issue.

Significance of research

House is a place for comfort, a place to meet comfort and a place to meet the physical and intellectual needs of individuals living in it. In Iran, according to a region's climate as well as the needs of each community, the house has indoor, open and semi-open spaces (Pileh Foroush, 2007, p. 15). The element of light in addition to climatic and environmental effect on architecture of residential houses has key roles in terms of the effect on the spatial and functional formation of architecture of houses (Shokoei zadeh, Ibrahim Yousefi, 2008, p.2), because informed use of natural elements especially light and color in architecture increases quality of living area spaces and presence of meaning in space in a way we had in traditional architecture. With the right lighting, the areas

to which significance is given are clarified. The right lighting gives us the right relationship which we tend to make it and a different façade to our living area. Proper lighting can raise sense of security and comfort in the man and avoid fatigue (Kateb, 2011, p. 67). Involvement of natural light in residential spaces in addition to increase of quality in living area spaces and separation of these spaces in terms of their function and even specific and new functional definition turn the space to a fresh and lively environment that family members tend to stay on it and use that environment, as a result when the living area of humans who spend most of their time there be fresh and lively, there will be a community with more healthy individuals.

Background of research

Yesterday's generation and today's generation are experiencing different houses. In the past, however houses were denied of many facilities, they were being built with the principles which were in favor of the individuals. Yet by the passage of time, not just quality of houses and significance of qualitative facet of light on formation and diversity of houses spaces were not increased, but their quantity also decreased. The houses with bleak rooms which have not the defined spaces for their specific functions indicate Iran's modern houses. Numerous studies have been conducted in the context of light in which the light has been examined from various aspects in different fields including agriculture, physics, psychology, art and architecture and so on for which numerous theories have been mentioned. "Effect of light of interior spaces on quality of life" by Fereshteh Nayebi aimed to examine significance and effect of light in interior spaces regarding effect of light on body and mind of man from light. Significance of light in Iranian architecture and use of light in design and creation of suitable and favorable space as well as the relationship between the surrounding space and environment and health of body and mind, growth of emotional in-

telligence and compliance with code of ethics regarding significance of how human is influenced of the environment to improve quality of life is examined (Nayebi, 2009, pp. 20-24). "Light space and light architecture" by Mousa Dibaj examined the light surrounding in architecture, how light relates to space, place features and light static intertwined with the issue of place and space. House and space diversity by Zahra Ghaznavian has examined the relationship with culturized nature. "Light in architecture" by Mohammad Mahdi Ostovan has examined role of light in creation of space diversity (Iranian house). According to the all related works, psychological effects of light on humans, light in Islamic mysticism and Sufism, light in Islamic architecture, application of natural light in public and private spaces of Iran's traditional architecture, spiritual and psychological effects of light in Iran's traditional houses on residents have been examined. The buildings in which qualitative aspect of light has been given attention are as follow: Hyatt Regency North Dallas Hotel which has been designed by Wolten Backs; significance of daylight in design of this hall has been taken into account (Evans, 1998, p. 10). Tall windows at mall in Kansas City reach the daylight evenly into space (Ibid, 15). The skylight in administrative building of architect consulting engineers is evident in the entrance part (ibid). The skylights in Hearst Memorial Mining Building in University of California, Berkeley give a specific attractiveness to interior space of this old and beautiful building (ibid). Skylights with colored glass in Houston Bridal Gallery make figure skating the daylight inside the shopping center and rink (ibid, 15). In Buckminster Fuller's three-dimensional dome, transparent glasses have been used which provide the sufficient light (ibid, 10). In Gandhi Hall building workshop in Harvard, clearstorey skylights have been used for lighting (ibid). Clearstorey skylights in Logan International Airport-Boston make this space needless of electrical light (ibid, 15). In TVA



building project in the city of Chattanooga, Sloping glass with mirror-like surface has been used to reflect the daylight to the depth of interior space (ibid). Multi-storey Entrance and communication hall, commercial complexes and hotels with lighting with daylight sunlight is very agreeable and acceptable to the people (ibid, 14). Abdul Rahman Mosque in Córdoba due to specific light practices in such a way that the light reflects on worship hall vertically has become well known (Major, 2005, p.48). Notre Dame de Paris in Ronchamp which was designed by Le Corbusier in 1955 has been targeted in using the natural light to create a dramatic and specific atmosphere (ibid). In windows of School of Theology & Christian, the colored light has been lighted the space by James Edward Carpenter (ibid). Time tower (1986) is an imaginary, light and artistic project to maintain technical services of hall at Water Tower, the main performance area of concert in Manchester, designed by Renton Howard Wood in 1986. This tower changes color to sign light at morning, seasons of year and days of week (ibid, 50). In Kimbell Art Museum, Fort Worth, Louis Kahn has been the architect and Richard Kelly has been designer of light (OLGYAY,EGAN, 1941, p.28). Building of united airline lobby in O'Hara International Airport, Chicago has created a beautiful combination of natural light, electrical light and architecture space (ibid); Interior space of Osaka, a work by Tadao Ando (Heidari, 2008, p. 45). Iranian market by embedding light from the ceiling has employed the daylight to improve the spaces (ibid).

Study and analysis of the architecture properties and extraction of principles and rules in Qajar houses

Introduction into Qajar houses

Architecture at Qajar age has been called architecture of housing and/or architecture of residential houses. At this age, due to increase of City dwellers population, establishment of house for new city dwellers was targeted. In architecture due to the relationship between

art of architecture at palaces and public buildings, samples of this western art have found in the urban houses and spread throughout Iran. Among these samples, it can mention the houses which have been specified with the main columned entrance and ceremonial grand staircase at the middle of entrance and the rooms are placed as two wings in the first and second floor, while there is a staircase at the corner in the past architecture of Iran. It goes without saying that the plan and western map are prevailed in these cases, but other Iranian elements and basically Iranian architecture with their decorations have blown a local spirit in it and a very pleasant and refreshing has gained (Sarami, 1998, p. 20). Qajar houses are the product of a cohesive age in which some specific forms of architecture were subjected to gradual changes. These changes especially at the end of Qajar age led to great changes in specific features of Iranian architecture. The great changes which occurred in architecture include:

- 1- Zig-Zag obsolescence: scutum arches replaced with semi-circle arches used in entrance, porch and window sills
- 2- balcony obsolescence
- 3- obsolescence of vertical and horizontal parasols (Kateb, 2006, p. 194)

In this part, 14 houses among Qajar houses in Yazd city have been selected that an identity has been considered for each one to introduce the house and its documents.

Rasoulia house

This building has been located at the old center of Yazd city in the south of a block consisting of valuable residential units and at the North East corner of Godal Mosala neighborhood, Sahl ibn Ali alley, Shahid Sadoughi alley, Imam Street. The main feature of this building has followed the structures of traditional and original architecture of Kavir and proper humanized pattern and life culture of residents have been complied in it. The used materials have been consistent with the patterns of architecture at this city, which mainly the mud,

Image	Plan	Current status	Position	Name of builder	History	Name of house	
		Faculty of art and architecture	Imam Khomeini Avenue, Godal Mosala neighborhood, Sahl ibn Ali alley	---	Qajar age	House of Mahdi Rasoulan	1
		Faculty of art and architecture	Imam Khomeini Avenue, Godal Mosala neighborhood, Sahl ibn Ali alley	---	Qajar age	Kermani house	2
		Faculty of art and architecture		Professor Mohammad Hassan Mohammad Rahim	Qajar age	Rasoulan house	3
		Faculty of art and architecture	Imam Khomeini Avenue, Godal Mosala neighborhood, Sahl ibn Ali alley	---	Qajar age	Pirmia house	4
		Faculty of art and architecture		scid Asadolah mazar	Late Qajar age	Gerami house	5
		Faculty of art and urbanization		Ab Shirazi	Late Qajar age	Mortaz house	6
		Cultural Heritage Administration		Haj Gholam Hossein Mola Zeynal	Qajar age	Lari house	7
		water Museum	Darol shafa neighborhood(Yazd) located in Kolahdouz Alley	---	Qajar age	Kolah douz house(water museum)	8
		Cultural Heritage Administration	Jame Mosque of Yazd	---	Qajar age	Shokoochi House	9

▲ Table 1. Introduction into Qajar houses

		Coin Museum	Imam street, Fahadan alley, across Imam Khomeini's house	---	Qajar age	Arabzadeh house (coin museum)	10	
		House under repair			Mirza Shafie	Qajar age	Shafie pour house	11
		Fahadan Museum Hotel			Sheikh Mahdi Arab	Qajar age	Tehrani house (Fahadan hotel)	12
					---	Qajar age	Akhavan house	13
		Abandoned house	Salman street-Gazegah alley	---	Qajar age	Farsad house	14	

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	Perspective	Section	Roof plan	Underground plan	Plan	Current status	Position	
						Faculty of art and architecture	Imam Khomeini Avenue, Godal Mosala neighborhood, Sahl ibn Ali alley	<i>Mahdi Rasoulian house</i>





▲ Table 2. Mahdi Rasoulian house

	Perspective	Section	Roof plan	Underground plan	Plan	Current status	موقعیت	
						Faculty of art and architecture	Imam Khomeini Street	<i>Kermani house</i>



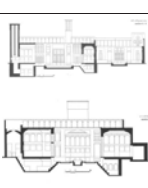
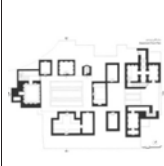


▲ Table 3. Kermani house

	Perspective	Plan	Underground plan	Roof plan	Section	Perspective	Current status	Position	
							Faculty of art and architecture		Rasoulian house

▲ Table 4. Rasoulian house

	Perspective	View of section	Plan	Current status	Position	
				Faculty of art and architecture	Imam Khomeini Avenue, Godal Mosala neighborhood, Sahl ibn Ali alley	Pirnia house

▲ Table 5. Pirnia house

	Perspective	Section	Underground plan	Plan	Current status	Position	
					Faculty of art and architecture	 محله سهول من علی - خیابان امام - کرچه پشت عدلی	Gerami house

▲ Table 6. Gerami house

straw, brick, plaster and wood have been used in the structure of building. The wooden door made of burl at northern hall has been the main feature of this building that moves beneath beat surface in a stairway form despite the patterned doors which move evenly in other buildings. The first important point in plan of this house is the separation of this house to two parts: the big yard is the main center and the small western yard is the smaller part of house. In addition, there is a backyard in the north of house which can be considered as the kitchen yard as it is located next to kitchen.

This building has been founded by Seid Asadolah Mazar at the late of Qajar age. With regard to the statements by current owner of house, in the past there was a marble above entrance; with regard to history of house, the lifetime of house is about 110-120 years. This wide house consists of two various parts that there is a yard at each part. These two yards have been established in the northeast – southwest direction. The southern yard is a bit larger than the northern yard and the spaces around it are greater than the other yard.

Conclusion

A great part of the work by an architect associates to creation of various spaces and making harmony in them. Diversity of space and concept of multipurpose space are the inter-

nal features of traditional house. This concept is consistent with people's daily life, streamed in physical spaces. With regard to significance of human living area as mentioned previously, the factors affecting creation of space diversity have been mentioned, seen that how diversity emerges at the unique scale of neighborhood, i.e. the factors include diversity in size, diversity in form of physical space, diversity in the light of common neighborhood space. Proper lighting meets the human needs and creates sense of comfort and security to him. With regard to significance and role of natural sunlight in life and its effects on mind and body of man, how light affects the spaces, light and movement, light and creation of tension in space and role of opening as an architectural element have been displayed. One of these factors and often all of them provide the house with an environment with high quality and far from noise in surrounding environment to individuals.

References

- Akbari, A. (2006) *functional ideas of light in educational environments, art and architecture: the art effects* - No. 26, 57 to 66
- Omid Azeri, Arthur, (2012) *Space, Architecture and Philosophy, Tehran: Yaslavi, pp. 20-25*
- Barati, N. (2004) *Recognition of the concept of home in Persian language and Iranian culture, art and architecture, imagination* - No. 8 24 to 55

- Pileh Foroush, R. (2007) *Windows at stucco house-Kashan, Journal of analytical theory, Issue 5, P. 15*
- Ching, Frank, (2007) *Architecture: Form, space and order*, Koroush, Mahmoudi, Reza, Basiri Mojdehi, *future builders of water city*, pp. 12-15
- Heidari, SH, (2008) *architectural lighting*, Tebran University, 42-50
- Dibaj , M, (2006) *Light space and Light architecture, art and architecture*, Bagh Nazr - No. 3 48 to 50
- SHATERLAN, R., (1386) *Introduction to form and space in architecture*, Tebran: Toorang, pp. 33-24
- Abdolhosseini, J., (2011) *adapting the design of Tabriz and Baku residential houses with native culture and climate*, art and architecture, Bagh Nazr, No. 18 , from 13 to 24
- Enayatollah, M. (2003) *Designing residential neighborhood in the city of Yazd*, MA thesis, pp. 30-24
- Feizi, S., (2010) *a new definition and classification of theoretical principles in the design of the house*, Iranian Home Regional Conference, P. 23
- Kateh, F. (2010) *Light in interior Architecture*, Tebran: Rab novin, P. 67
- Karlan, M, Bina, J, (2009) *Principles of Lighting in architecture*, Kouros, Mahmoudi, Zabra, Jamsbidi , Homa, Samet, *Water city, future builders*, Tebran, pp. 45-50
- Clare Cooper, Marcus (2004) *House: a symbol of the self*, Aligholian, A., *art and architecture, fantasy*, No. 5, from 84 to 119
- Morteza Zadeh Daraqeh, H., (2006) *Ava and lighting engineering in architecture*, Tebran: Hajir, P. 31