Creative city design / Vol. 5, No. 3, 2022, 43-60

Reading the Architectural Spatial Organization of the Houses of Mashhad during the Transition Period, Emphasizing the Concept of Privacy[1]

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Submit Date: 30 July 2022, Accepted Date: 05 October 2022

Abstract
As a result of the tendency of the Qajar and Pahlavi kings toward modernity, the lifestyle of Iranians transformed at an incredible speed. The changes in the way of life affected the architecture of the houses and caused shifts in the direction of the desire for extroversion and reducing the amount of privacy. Therefore, the main goal of this research is to study the effect of the spatial organization of houses in creating privacy. Accordingly, the main question of this research is how the concept of privacy in Mashhad houses has been affected by the characteristics of the spatial organization of houses in the transition period. The research method is based on the Space Syntax. In general, the methods used in the current research are divided into two main categories: documentary and field. The statistical population of study includes the houses built from 1895 to 1941, within the historical context of Mashhad. The results show that the houses of Mashhad during the transition period had an introverted spatial organization, which the level of introversion of the houses was gradually reduced. In general, it can be observed that the political, social, and cultural changes in this city quickly and during a short period were represented in the architecture of the houses. Even the presence of an element as powerful as religion could not practically keep the sanctuary of the holy city away from major social changes and transformations, which were taking place at the country level.

Keywords: *Architecture, Spatial Organization, Privacy, Mashhad, Transition Period*.

1. Introduction

Following historical events in the middle of the Safavid period, Western thought and culture gradually penetrated into the traditional world of Iranians. With the development of relations between Iran and Europe in the Qajar era, the process of expansion and spread of Western culture gained a double speed. The change of the power structure from Qajar to Pahlavi and the modern ideas of Reza Shah also caused the break from the traditional world to accelerate without any preparation and infrastructure being provided for entering the modern world. Iranian architecture (and especially house) was no exception to this rule.

The return of architectural graduates from Europe, the presence of archaeologists [1] and western architects in Iran [2], nationalist tendencies [3] and the militaristic nature of Reza Shah [4] etc. caused the interconnected rings of architecture to break apart and a new way to emerge. And this took a different direction in the following years as construction technology grew, land prices rose, oil revenues inflowed, and most importantly, lifestyles changed. The same issue became more complicated in the construction of houses because the architecture of houses is not only directly related to people's way of life, but in comparison with public and government buildings, it is less subject to orders and regulations and is mainly based on personal taste and wishes of the users.

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1. This article is taken from the doctoral dissertation of the first author "Reading the Spatial Organization of Mashhad Houses during the Transition Period, with Emphasis on the Concept of Privacy" at the Islamic Azad University, Mashhad Branch under supervise of the second author and the advise of the third author.

Undoubtedly, one of the most important milestones in the history of Iranian architecture is the end of the Qajar period and the beginning of the Pahlavi dynasty. The excessive closeness of this period to the present time has caused many architectural values (especially residential architecture) of the Reza Shah period not to be understood well enough, and the destruction of many of these houses in recent years is proof of this claim. Therefore, the problem of the present research can be stated in simple language as follows: As a result of the tendency of the Qajar and Pahlavi kings toward modernity, the lifestyle of Iranians transformed at an incredible speed. The changes in the way of life affected the architecture of the houses and caused shifts in the direction of the desire for extroversion and reducing the amount of privacy. Therefore, this research aims to read the spatial organization of Mashhad houses in the transition period with an emphasis on the concept of privacy.

Based on what was said, the main goal of this research is to study the effect of the spatial organization of houses in creating privacy. Accordingly, the main question of this research is how the concept of privacy in Mashhad houses has been affected by the characteristics of the spatial organization of houses in the transition period.

2. Literature Review

2-1. Spatial Organization: One of the most important topics that can be considered and discussed about Iranian houses is the spatial organization. Spatial organization refers to the systematic arrangement and distribution of units and elements of a complex in space, in line with the general functions of the complex [5]. In this sense, spatial organization is not only a community of elements and their relationships, but also includes interactions between elements in different constructions. In this way, spatial organization is the result of functional and relational interactions of constructions and elements in space. In other words, spatial organization is the way of placing the components of space in relation to each other in such a way that their interaction and complementary relationships become possible. In fact, the order and arrangement of a set of nodes, activities related to them, and mutual actions through communication networks in space is called spatial organization. In general, spatial organization is the functional result of communication of constructions and elements in a spatial area [5].

The constituent elements of spatial organization are **Form**, **Space** and **Order**, which according to the purpose of the present study, Mass-Space arrangement is more important in Iranian houses and it is discussed further.

- Mass-Space Order; in terms of the number of masses: in Iranian houses, the masses have been generally placed next to each other based on one axis and with special attention to the powerful element of the yard. The number of masses in conventional plans has been from one to four around the yard based on practical needs. Based on the house size, sometimes the main mass (internal) and secondary mass (external) were formed. Factors such as geographical order, climatic order, and sacred order have influenced the way masses are placed around the yard. (Figure 1)

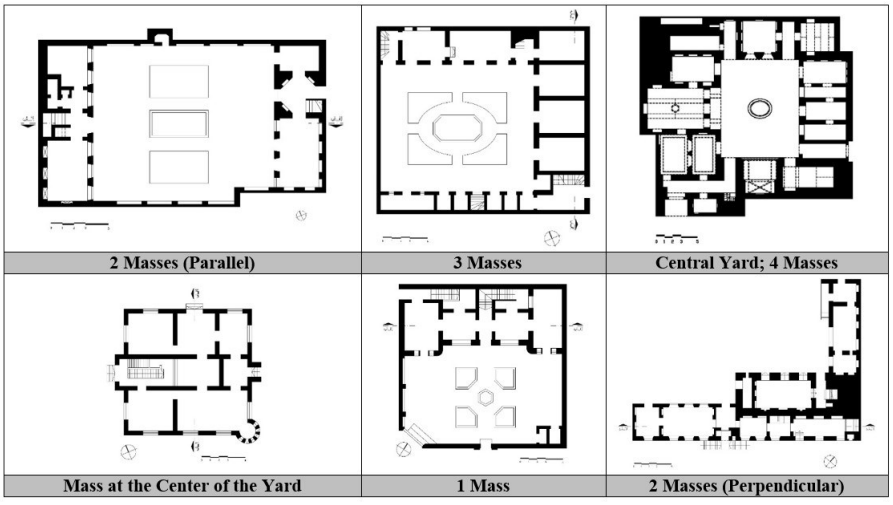


Figure 1. Mass-Space Order; in terms of the number of masses.

- Mass-Space Order; in terms of mass and entrance position: The number and position of entrances in Iranian houses has affected on the Mass-Space order and it has been one of the factors of creating introversion and privacy, which will be extensively discussed later. But on this occasion, a visual reference has been made to the different types of placement of masses and the relation between main entrance and privacy. (Figure 2)

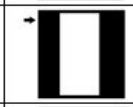
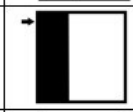
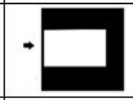
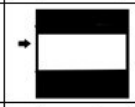
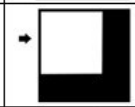
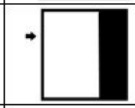
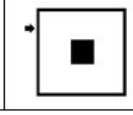
Type	Plan	The Degree of Introversion	Description
Completely introveted		10	Massese on four sides of the yard entrance to the mansion
introverted		9	Massese on three sides of the yard entrance to the mansion
Somewhat Introverted 1		8	Massese on two parallel sides of the yard entrance to the mansion
Somewhat Introverted 2		7	Massese on two perpendicular sides of the yard entrance to the mansion
Somewhat Introverted 3		6	Mass on one side of the yard entrance to the mansion
Somewhat Extroverted 1		5	Massese on three sides of the yard entrance to the yard
Somewhat Extroverted 2		4	Massese on two parallel sides of the yard entrance to the yard
Somewhat Extroverted 3		3	Massese on two perpendicular sides of the yard entrance to the yard
Extroverted		2	Mass on one side of the yard entrance to the yard
Compeletely Extroverted		1	Mass at the center of the yard entrance to the yard

Figure 2. Mass-Space Order; in terms of mass and entrance position

2-2. Privacy: The Persian equivalent term for privacy (*mahramiyat*) is originally an Arabic word that means confidentiality, secrecy, and kinship [6]. From the eastern point of view, privacy in the architectural space and urban planning means to give form to the space in such a way that it has privacy from both physical and semantic aspects. Having privacy in the field of the spatial body is more focused on the principles that form the security of the space. In the semantic field, it has characteristics that bring respect and value to the architectural space in such a way that a person feel relaxed in it. In fact, a space can be considered private if it physically has privacy and security for the user and its spatial qualities are such that it provides peace and comfort to the person [7]. Providing privacy in the body of houses is possible by using the capabilities of the spatial organization, and reciprocally, the concept of privacy, as a part of the Iranian Islamic lifestyle, affects the formation of the spatial organization.

The distinction between private section and other sections is in many cases related to the way of spatial organization in a complex (with the aim of controlling access from one space to another). The common pattern of closed, semi-open, and open spaces (room + porch + courtyard) is an example of organization that has been very effective in creating access hierarchy. Babazadeh Oskoyi and his colleagues consider the control of spatial

connectivity in architecture to be the factor of controlling behavioral relations in human interactions, which plays a major role in providing visual privacy, accessibility and, as a result, psychological privacy. Therefore, the development of the architectural physical system based on the creation of spatial hierarchies and accessibility can be effective in improving the quality of human behavior and as a result, privacy [8]. Among the important principles in the formation of the bodily system based on privacy, the following can be mentioned.

- **Location:** The location of each space in the architectural body is determined by various components such as lighting, connections, dimensions, importance and vision. The personal spaces of individuals and the family were located in parts of the plan that were protected from the direct view of strangers and guests. The entrance of the house was located in places that created no direct visual connection with the interior spaces [9]. The kitchen was built in a place where the housewife could easily work in it [10]. On the other hand, the position of each element is meaningful in relation to the whole work. In other words, each space with a certain form and a certain scale has different semantic implications based on various establishments and how it is related to other spaces.
- **Relationships:** this feature refers to how an element is combined with other elements, based on which the movement or access from one form to another is understood so that the combined meaning and form is different from the meaning and form of the element in isolation.
- **Scale and proportion:** this feature indicates the difference in meaning based on the change in the scale and size of the space. A space with a specific form will have different meanings in different scales. In the process of creating an architectural work, every thought and architectural idea is expressed in the form of numerical and geometric proportions, and a physical structure is created according to that thought [11]. Among the most important geometric and numerical ratios is the ratio of filled and empty spaces or the **ratio of mass and space**. In this regard, Edmund Bacon, introducing the two components of mass and space as the two main components of architecture in his book titled *Design of Cities*, considers the main essence of design to be the mutual relationship between these two elements [12]. Falahat and Shahidi believe that the relationship between full and empty parts in architecture constitutes its quantitative and qualitative characteristics [13].
Also, the proportions can increase or decrease the privacy of the spaces due to reducing or increasing the dimensions of the spaces. For example, the height of the vestibule, which has a more general role than other entrance spaces, is higher, and the hallway has a lower height, which makes it more private than the vestibule. Thus, reducing the dimensional proportions of spaces, such as three-doors compared to five-doors or king-size rooms, will improve the privacy of the rooms [14].
- **Function:** The function of any space is a platform for the production of meaning and form. Therefore, each space based on its function acquires a specific position, proportions, and connections with other spaces. For example, the functions that were specific to women, due to the importance of the role of women in the situation and the way of spatial formation, were assigned to the internal part. However, in the contemporary period, extensive developments in the cultural, economic and social fields caused a change in the way of looking at the gender role, and subsequently, in the architecture of the contemporary house, the position and relationships of the functions have been assigned a different definition and position. Therefore, the function of spaces is affected by internal and external factors, and a single phenomenon has different results due to different functions. (Figure 3)

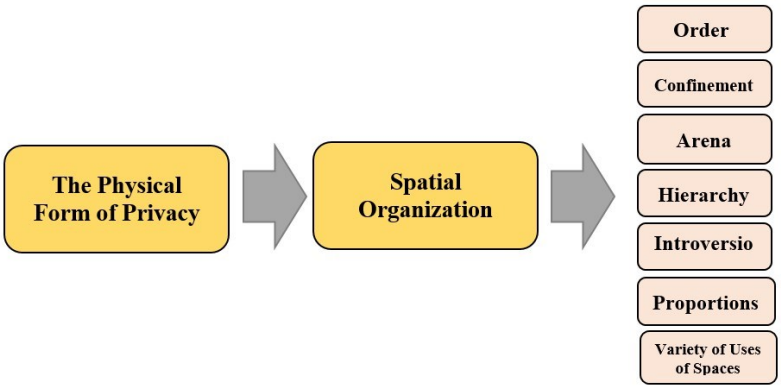


Figure 3. Spatial organization factors, effective in creating the physical form of privacy

2-3. Transition period: If we say that the fascination and excitement that visiting Europe caused in the hearts of the Qajar kings spread quickly and to all fields of politics, society, culture and art, we are not saying too much. Many researchers believe that during the last one hundred and fifty years Iranian architects have been able to leave behind works that deserve to be recognized carefully and scrutinizingly. This time period also had milestones in its heart, of which the end of the Qajar rule and the beginning of the Pahlavi dynasty should be counted as the most important. In addition to the personality differences between Reza Shah and the Qajar kings, changes in the government structure, Reza Shah's tendency towards nationalism, the influence of foreign architects in Iran, the impressive speed of Europe towards industrialization, European art movements, etc., caused this historical milestone to have obvious and immediate effects on architecture and gave Iranians an incredible speed to break away from the traditional world and enter the modern world. With this in mind, the current research focuses on the third period of Qajar rule, that is, from 1881 to 1925 and the first Pahlavi rule, from 1925 to 1941.

Regarding the decline of Qajar architecture and the rise of Pahlavi architecture, there are different and sometimes contradictory interpretations. Some researchers consider the created cultural break as the source of cultural decline and believe that since the end of the Qajar period, architecture, like other subjects, began to decline. "The second period of it [Isfahani style] is the time of regression (decline) of this style, which actually started from the time of the Afsharians and was followed in the time of the Zandians, but the complete regression began at the time of Mohammad Shah and was revealed in the architectural transformations of Tehran and the cities close to it" [22]. "Nevertheless, the architectural and art process of this land, which was continuous like a chain until the time of Fath-Ali Shah and Mohammad Shah, broke apart and went backwards due to cultural diffidence, especially during the time of Naser al-Din Shah" [23]. However, a great number of researchers have a different view. Some consider this historical time the period of westernization of Iranian thought and view [2] and some others hold the idea that the contemporary architecture of Iran has been indicative of three important factors; ancient architecture, Islamic era architecture, and Western architecture [24]. In this research, the third Qajar period and the first Pahlavi period are collectively called the transition period. (Figure 4)

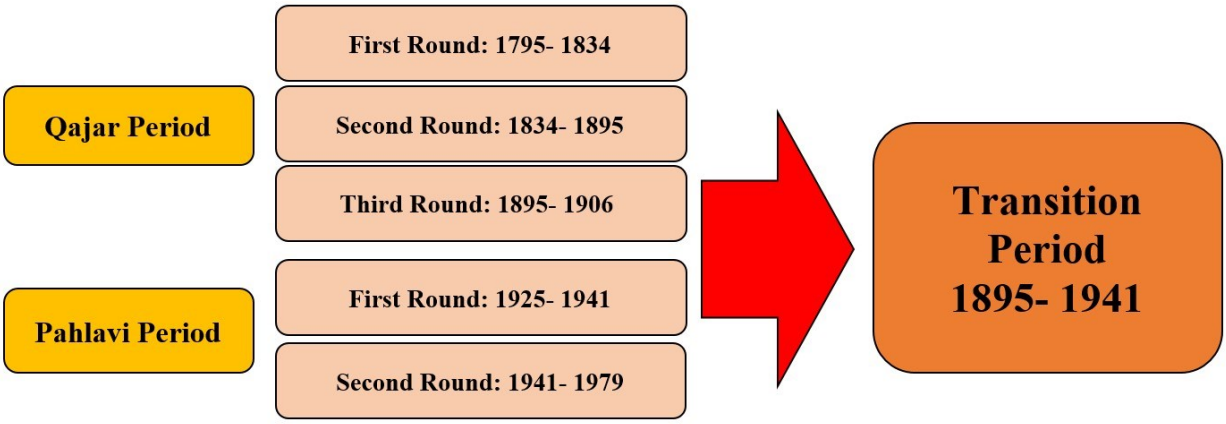


Figure 4. Transition Period

2-4. Mashhad: The area that is called Mashhad city today was a part of Toos territory. In the suburbs of Toos, there were many villages, the most prosperous of which were Bezghan, Turan, Broghan, Noghan, Radkan and Sanabad. The name of Sanabad village was mentioned in history for the first time due to the burial of Harun al-Rashid in the governor's garden of Khorasan [25]. After the burial of the honorable body of Imam Reza (PBUH) in the same place, the city was called Mashhad al-Reza (literally meaning the martyrdom place of Reza) by the people, which later was clipped to Mashhad. The wall of the city was built by Shah Tahmasp (known as Shah Tahmasbi wall) which gradually collapsed later at the late Qajar period. Mashhad also had six gates, including Bala-Khiyaban gate, Sarab gate, Arg gate, the Eidgah gate, Payin-Khiyaban gate, and Noghan gate [26]. The citadel building, built during the reign of Abbas Mirza (son and viceroy of Naser al-Din Shah) in the southwest of the city, was destroyed

around 1920 and the building of Bank Melli Iran was constructed in its site [27].

The population of Mashhad city at the end of Qajar period is estimated to be around seventy to eighty thousand people. When Reza Shah came to power and established order and security in the transportation routes of the country, Mashhad also developed as one of the important cities and the center of pilgrimage, trade, and tourism [28]. Due to the development of the population, interference in the physical structure of the city also began with the destruction of parts of the old structure and the construction of new streets, among which we can mention the construction of Tabarsi Street, Tehran Street (Imam Reza), etc. In addition to the physical interventions, some other activities also provided the grounds for the transformation of the image and the physical growth of the city.

Most of these activities can be classified into five categories as follows.

- Establishment of government offices, institutions, and departments
- Establishment of economic institutions, including banks and factories
- Establishment of medical and health institutions, including hospitals and pharmacies
- Establishment of social institutions and organizations, including charitable institutions, public entertainment venues, cinemas, hotels, boarding houses, inns, cafes, and restaurants
- Establishment of new schools and cultural institutions, including girls' and boys' schools in all levels of education, public and private libraries, printing houses, newspaper offices.

Parallel to the arrival of western civilization and life in the city of Mashhad, some political events such as the occupation of Khorasan by Russian forces and the bombing of Razavi's shrine, the occurrence of the socialist revolution in Russia, and the interruption of trade between Central Asia and Mashhad provide this opportunity for Reza Shah to order the closure of the Mashhad seminary under the pretext of providing security, but in reality due to the struggles of the clerics and the bloody incident of the Goharshad Mosque in 1935 [29].

In fact, even despite a powerful element such as religion in Mashhad, this city practically could not keep itself away from the major social changes and transformations (which were taking place at the national level), including the discovery of the hijab, the uniformization of men's clothing, the formation of new social classes (under the titles of military and civil people), the establishment of a new administrative system, the change in the style of education and the formation of new schools, the entry of cars into the urban transportation network, and the like had a tremendous impact on people's lifestyle. The results of the changes in the lifestyle of the people in Mashhad at the end of the Qajar period and the reign of Reza Shah can be summarized in Table 1. (Table 1)

Table 1. The effect of the structural changes of the society on the way of life of the people of Mashhad during the transition period. [39]

Factors	Examples of Modifications	The impact of Changes on Life style
Changes in the physical structure	Destruction of old tissue	Development of public and collective spaces
	Street construction	
	Vehicle entry into the intra-city transportation network	Creating emerging urban spaces such as square and street
	Changing the shape of markets and creating showcases	Promotion of consumerism
		Changing the style and way of shopping
Change in the administrative structures	Establishment of government offices and departments	Development of public and collective spaces
		The formation of a new social order
Change in the financial and economic structures	Establishment of banks	Change in the way of earning, saving and financial management of life
	Establishment of factories and production institutions	Mass production of goods
Changes in the health and treatment structures	Construction of hospitals and pharmacies	Increase life expectancy
		Increase in the city's population
		Increasing the size of the household
		retirement age
Changes in the social structures	Establishment of charitable institutions	Separation of parts of society from families
	Construction of public parks	Development of collective and public spaces
	Construction of cinemas	Change in leisure style
	Construction of cafes, restaurants, hotels and...	Change in eating style and food taste
		Change in leisure style
		Increase in the number of travelers and pilgrims in the city throughout the year
	The formation of an independent family institution	Changes in family decision-making
		Gradual separation of generations
Changes in the cultural structures and foundations of the city	Establishment of new schools, libraries, printing houses, etc.	Believing science and rationalism
		Empirical science is preferred over traditional science
		anti-traditionalism
	Unveiling	Changing the role of women in the structure of family and society
		The entry of women into the field of production and business
	Uniform men's clothing	Inducing a new social order to people
	The formation of military and country social classes	Creating a class gap in society

3. Materials and Methods

Considering the set goals, the positivist approach has been used in the current research. The nature of research in subjects related to art and architecture often requires different methods to be used in different parts of a research. The research method is based on the Space Syntax and tries to discover the relationship between physical characteristics and the level of privacy in the architecture of Mashhad houses during the transition period. In general, the methods used in the current research are divided into two main categories: documentary and field. The statistical population of the present study includes the houses built in the third period of the Qajar era (from 1895 to 1906) and the entire period of Reza Shah Pahlavi's rule (from 1906 to 1941) within the historical context of Mashhad.

In the present study, the samples were selected based on the judgment of the researchers in a non-random and non-probabilistic manner, and for the validity of the sampling, cases of study were selected based on the following criteria:

- The building should be preferably registered in the list of national monuments; although some houses have not yet been registered in the said list, some others have been destroyed before or during the research, and some of them have been removed from the list of national monuments by the decision of the Administrative Court of Justice.
- The building must be of architectural and artistic values so as to provide the possibility of analytical studies.
- The selections should represent residential houses of different strata of the society.
- The geographical distribution of the samples throughout the historical context of Mashhad should be taken into account.
- The time distribution of the samples (in terms of year and construction period) during the specified periods should be taken into consideration.

Based on the above criteria, out of a totally over seventy Qajar and Pahlavi houses identified in Mashhad, 25 houses (more than 30%) were selected as samples, which is considered an

acceptable percentage of the statistical population. Obviously, considering the number of indicators under study and the large volume of the statistical population, the number of samples has been chosen in such a way that the amount of duplicate data is as low as possible. The selected samples are introduced in Table 2 and Figures 5 and 6.

Table 2. Sampel Houses

Period		Name of House	Reg. No.	Reg. Date
Qajar	1	Balkhast	12384	02-08-2005
	2	Tavakkoli	12374	02-08-2005
	3	Darougheh	6357	29-09- 2002
	4	Ghaffouri	12393	02-08-2005
	5	Amiri	12132	21-07-2005
	6	Hanasab	11014	07-08-2004
	7	Davoodi	2918	10-12-2000
	8	Rahimian	11088	06-09-2004
	9	Malek	2115	09-09-1998
	10	Nazeran	12389	02-08-2005
Pahlavi	11	Barati	13881	16-08-2005
	12	Bani Hashemi	13915	29-01-2006
	13	Behzadian	---	---
	14	Tamaddoni	12065	03-07-2005
	15	Tavakkoli Zadeh	9254	17-07-2003
	16	Rajaee	---	---
	17	Salari	12069	03-07-2005
	18	Sarvghad	---	---
	19	Talaee	12068	03-07-2005
	20	Mojtahed Zadeh	---	---
	21	Majidian	---	---
	22	Mousavi Parishani	12066	03-07-2005
	23	Talaat Mousavi	13372	16-08-2005
	24	Molavi	---	---
	25	Mirza-e Nazer	---	---

Figure 5. Ground Floor of Qajar Period Houses

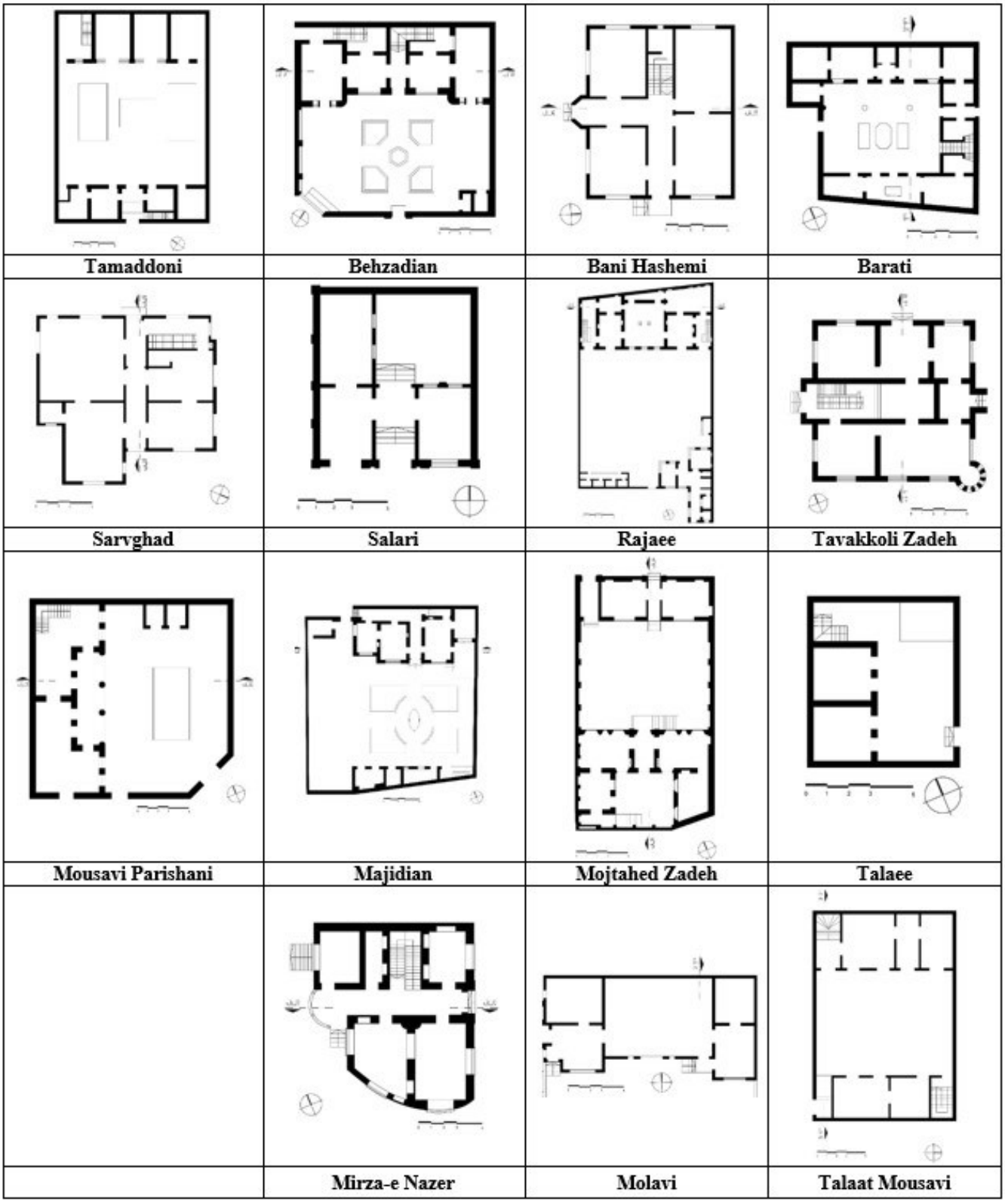


Figure 6. Ground Floor of Pahlavi Period Houses

- Space Syntax: To analyze the structure of artificial spaces, there are different methods, each of which has special tools. These tools include quantitative (mathematical and computer) and qualitative types (explanation and application of various theories in the field of providing architectural design patterns before construction) whose implementation results somehow describe the function of the space, and social interpretations can be made with respect to the data related to each of them.

In 1984, Bill Hillier, in collaboration with Julian Hanson, presented a new theory of space as an aspect of social life [15]. He tried to discover the rules that could be obtained from examining different layout patterns in different spaces. According to him, different spaces reflect the different ways of life of their users, and by using the space syntax method, it is possible to understand the cultural and social characteristics of its inhabitants, which influence the formation of different spatial patterns [16].

- Space Syntax Indicators

A. Connectivity: The concept of connectivity refers to the number of links that are created directly between each space and other spaces [11]. The objective concept of connectivity refers to spatial connections, that is, the higher the degree of connectivity, the greater the number of connections between the space in question and other spaces. Therefore, it can also be referred to as the level of access. The numerical value of the connectivity expresses the number of accesses leading to the desired space [19].

B. Visual Entropy: Entropy indicates the amount of disorder in a system. In the syntax of space, the concept of visual entropy is directly related to the level of visibility and is also related to the concept of clarity and readability [11].

C. Movement Circulation: Movement circulation is a parameter that determines the way and direction of movement of people in a space or a set of spaces [19].

D. Depth: The concept of depth in space syntax technique has two meanings. In the first sense, which is known as metric depth, it means the distance (number of steps) between two points. Its second meaning, called step depth, means the number of spaces that a person must travel from one point (in most cases, the depth is measured relative to the entrance of the building) to reach another point [20]. The metric depth can be calculated using *Depth Map* software, and the step depth can be calculated by the analysis of justification diagrams.

E. Integrity: Integration of a space in a spatial configuration refers to the degree of continuity or separation of that space compared to other spaces in that configuration [11].

4. Results

The findings of the research concerning introversion and privacy are summarized in Tables 3 and 4, separately for the houses of each period. Summary and analysis of data is provided in Table 5.

Table 3. Research findings regarding the introversion and privacy of Qajar period houses

	Hirarchy			Indirect Vision			Form of the Yard	Area's Seperation		
	No. of Entrances	Location of Entrances	Circulation	Window to Street	cirridor	Porch (Hashti)		Public	Private	Semipublic
Amiri	1	Corner of Building	Linear	---	---	✓	Rectangle	✓	✓	✓
Balkhast	1	Middle of Yard	L- Linear	---	---	---	Rectangle	✓	✓	✓
Tavakkoli	2	Middle and Corner of Building;	L	✓	✓	✓	Rectangle	✓	✓	---
Hanasab	1	Middle of Building	Broken Linear	✓	✓	✓	Rectangle	✓	✓	✓
Darougheh	1	Corner of Building	L- Linear	---	✓	✓	Rectangle	✓	✓	✓
Davoodi	1	Corner of Building	Linear	✓	---	✓	Rectangle	✓	✓	✓
Rahimian	2	Corner of Building	Broken Linear	---	✓	✓	Rectangle	✓	✓	✓
Ghaffouri	1	Corner of Building	L- Linear	✓	✓	✓	Rectangle	✓	✓	✓
Malek	1	Middle of Building	Linear	✓	---	✓	Rectangle	✓	✓	✓
Nazeran	2	Middle of Building	Linear	---	✓	---	Rectangle	✓	✓	✓

Table 4. Research findings regarding the introversion and privacy of Pahlavi period houses

	Hirarchy			Indirect Vision			Form of the Yard	Area's Seperation		
	No. of Entrances	Location of Entrances	Circulation	Window to Street	cirridor	Porch (Hashti)		Public	Private	Semipublic
Barati	2	Middle of Yard; Middle of Building	Linear	---	✓	---	Rectangle	✓	✓	✓
Bani Hashemi	2	Middle of the Yard	Broken Linear	---	---	---	Rectangle	✓	✓	✓
Behzadian	3	Middle of Yard	Broken Linear	---	✓	---	Rectangle	✓	✓	✓
Tamaddoni	1	Middle of side of the Building	Linear	---	---	---	Rectangle	✓	✓	✓
Tavakkoli Zadeh	2	Middle of Yard	Linear	---	---	---	Rectangle	✓	✓	✓
Rajaee	1	Corner of the Building	Broken	---	✓	---	Rectangle	✓	✓	✓
Salari	1	Middle of side of the Building	Broken	✓	---	✓	Rectangle	✓	✓	---
Sarvghad	2	Middle of Yard	Broken	---	---	---	Rectangle	✓	✓	✓
Talaee	1	Corner of Yard	Linear	---	---	---	Rectangle	✓	✓	---
Mojtahed Zadeh	2	Middle and Corner of Building	Broken Linear	---	✓	---	Rectangle	✓	✓	✓
Majidian	2	Corner of Yard and Building	Linear	---	✓	---	Rectangle	✓	✓	---
Mousavi	2	Middle of side of the Building	Linear	---	---	---	Rectangle	✓	✓	---
T. Mousavi	1	Corner of Building	Linear	---	✓	---	Rectangle	✓	✓	---
Molavi	2	Corner of Building; Middle of Yard	Linear	✓	---	---	Rectangle	✓	✓	---
Mirza-e Nazer	2	Middle of side of the Building	Broken Linear	✓	---	---	Rectangle	✓	✓	✓

Table 5. Analysis of research findings about introversion and privacy

	Hirarchy										Indirect Vision				Arena Separation					
	No. of Entrances						Location of Entrances													
	1		2		3		Into Yard		Into Building		Corridor		porch		Public		Private		Semipublic	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Qajar	7	70	3	30	0	0	1	7.6	12	92.4	6	60	8	80	10	100	10	100	9	90
Pahlavi	5	33.2	9	60.2	1	6.6	14	53.8	12	46.2	6	40.2	1	6.7	15	100	15	100	9	60.3

As the table shows:

- The houses of the Qajar period mostly (70%) have one entrance, but the houses of the first Pahlavi period often (60.2%) have two entrances.
- Except for one case, all the entrances of the Qajar houses open to the inside of the building and thus, visibility of the house is minimized; while in the houses of the first Pahlavi, one of the entrances of the house opens to the yard in 53.8% of the cases and this has negatively affected the level of privacy.
- Findings about the number of windows to the public passages show differences with what the researcher expected. Qajar houses, which tend to be introverted, in 50% of cases have a window to the passage, which undoubtedly has an effect on reducing the amount of introvertedness. The studied samples of the first Pahlavi period do not have windows facing the passages.
- Although the installation of windows facing the public passage has reduced the introversion of Qajar houses, the use of corridors in 60% of cases and vestibules in 80% of cases has improved privacy. In the first Pahlavi houses, this amount has decreased to 40.2% for the corridors and to 6.7% (1 case) for the vestibules, indicating the gradual removal of privacy elements such as the corridors and the vestibule.
- In most of the houses under study, spaces are divided into public, private, and semi-private areas.
- All the studied houses in both historical periods have spatial independence, and only in one case (Malek's house) the internal-external pattern is observed.

1-3. Analysis of findings using Space Syntax: In computer analysis, ground floor plans of houses have been analyzed with Space Syntax software. The indicators that have been investigated are **Connectivity**, **Entropy**, **Circulation**, **Depth**, and **Integrity**. Images related to the analysis of the Connectivity are presented here. (Figures 7 and 8)

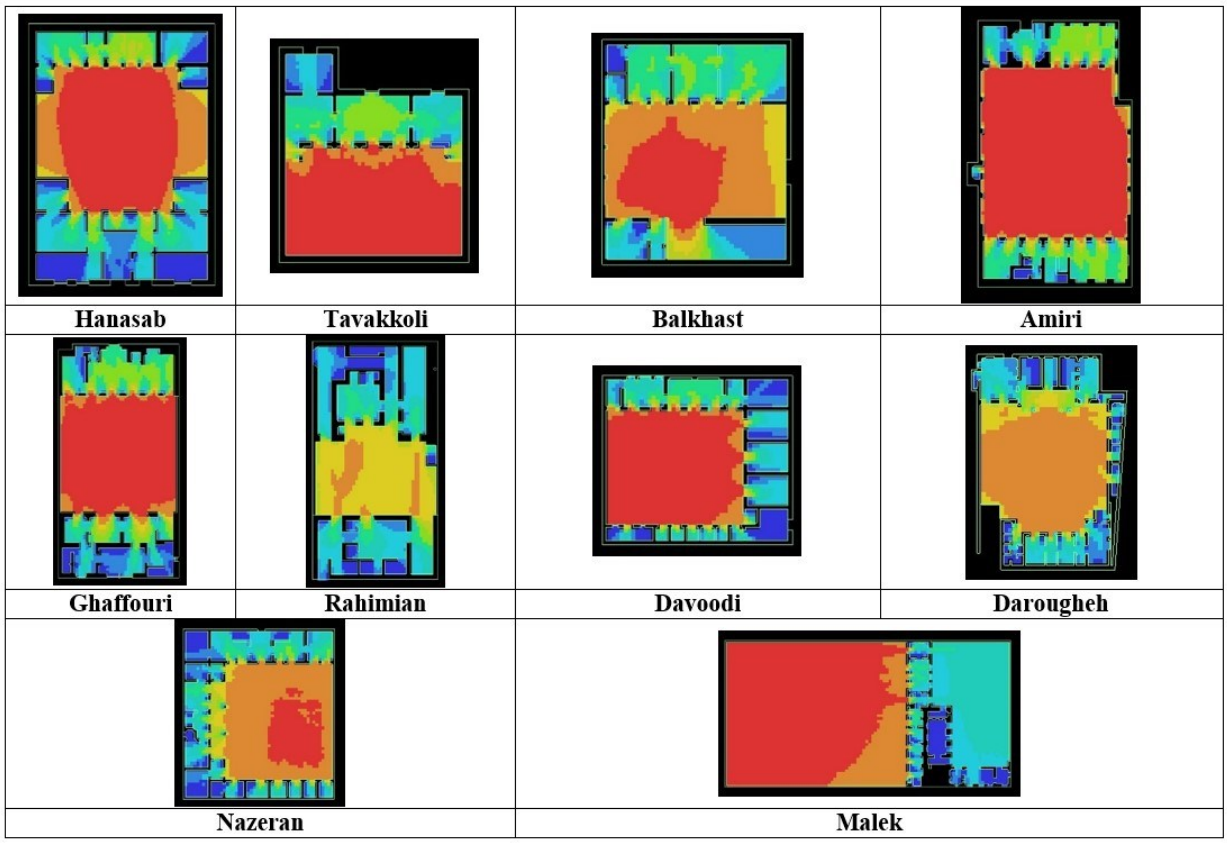


Figure 7. Connectivity of Qajar period houses

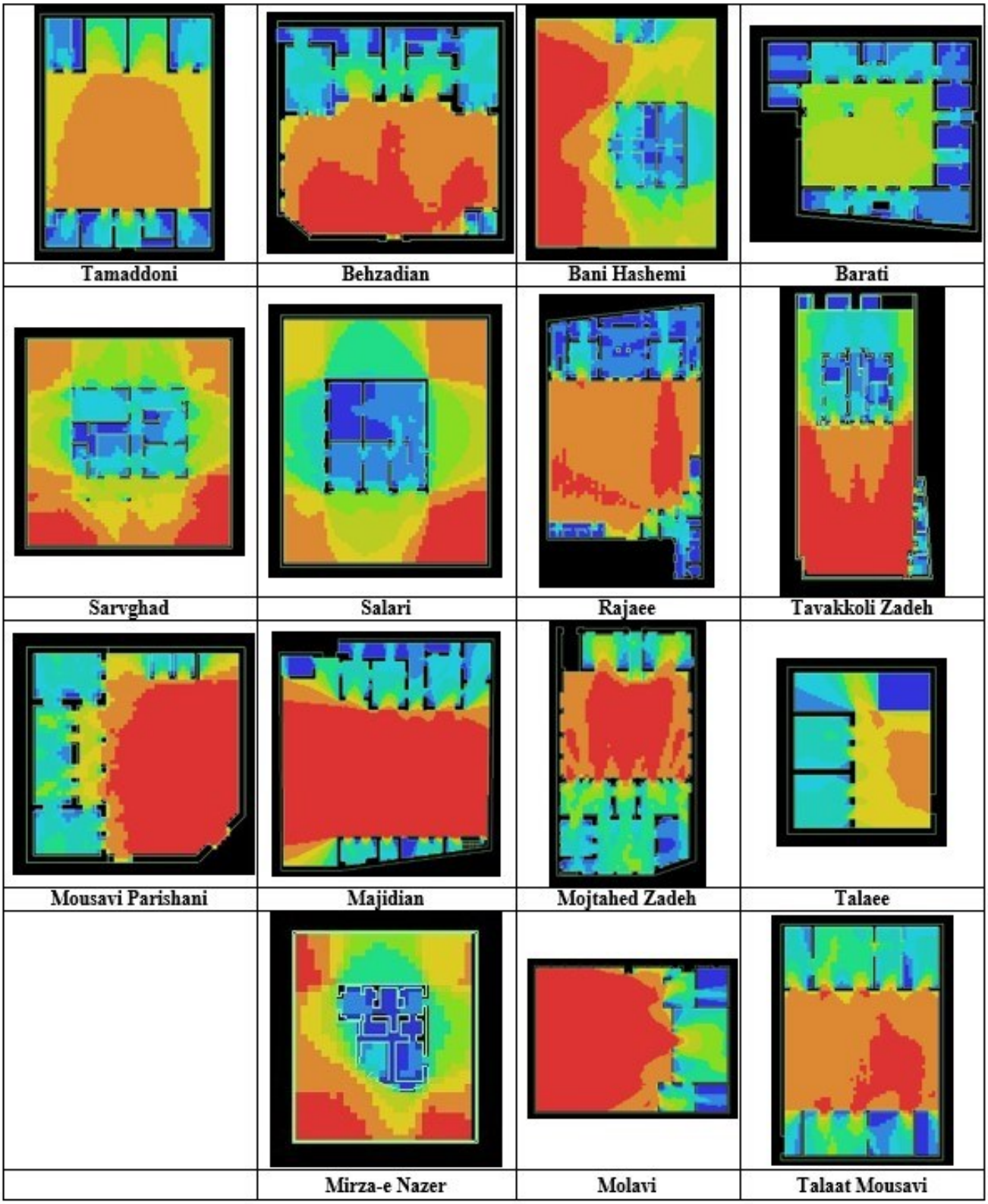


Figure 8. Connectivity of Pahlavi period houses

The degree of privacy of the houses of each period based on analysis with the help of software are presented in Tables 6 and 7 .

Table 6. The relationship between factors of Space Syntax and Privacy; Qajar Houses

	Connectivity		Privacy	Visual Entropy		Privacy	Circulation		Privacy	Spatial Depth		Privacy	Integrity		Privacy
Amiri	10	M	M	1.77	H	H	0.71	L	H	1.81	H	H	9.81	L	H
Balkhast	34	H	L	1.01	M	M	0.83	M	M	1.47	L	L	23.04	H	L
Tavakkoli	11	M	M	1.11	M	M	0.88	M	M	1.54	M	M	18.62	M	M
Hanasab	83	H	L	1.20	H	H	0.80	L	H	1.84	H	H	11.98	L	H
Darougheh	1	L	H	1.28	H	H	0.76	L	H	2.44	H	H	12.58	L	H
Davoodi	10	M	M	1.25	H	H	0.77	L	H	2.60	H	H	10.17	L	H
Rahimian	15	M	M	1.25	H	H	0.67	L	H	1.74	M	M	14.18	M	M
Ghaffouri	6	M	M	1.26	H	H	0.79	L	H	1.87	H	H	12.78	L	H
Malek	10	M	M	1.26	H	H	0.80	L	H	2.53	H	H	12.19	L	H
Nazeran	15	M	M	1.21	H	H	0.69	L	H	2.53	H	H	11.77	L	H

Table 7. The relationship between factors of Space Syntax and Privacy; Pahlavi Houses

	Connectivity		Privacy	Visual Entropy		Privacy	Circulation		Privacy	Spatial Depth		Privacy	Integrity		Privacy
Barati	20	H	L	0.99	L	L	1.80	H	L	1.58	M	M	18.99	M	M
Bani Hashemi	31	H	L	0.96	L	L	2.71	H	L	1.54	M	M	18.44	M	M
Behzadian	72	H	L	0.94	L	L	2.11	H	L	1.48	L	L	22.43	H	L
Tamddoni	12	M	M	1.22	H	H	0.79	L	H	2.05	H	H	12.57	L	H
Tavakkoli Zadeh	89	H	L	0.98	L	L	3.21	H	L	1.47	L	L	22.34	H	L
Rajaee	7	M	M	1.32	H	H	0.78	L	H	1.85	H	H	11.27	L	H
Salari	170	H	L	1.29	H	H	0.76	L	H	1.80	M	M	13.78	M	M
Sarvghad	24	H	L	0.94	L	L	3.17	H	L	1.50	L	L	23.27	H	L
Talaee	249	H	L	1.03	M	M	1.18	M	M	1.44	L	L	28.86	H	L
Mojtahed Zadeh	15	M	M	1.25	H	H	0.77	L	H	1.84	H	H	12.78	L	H
Majidian	58	H	L	0.85	L	L	1.50	H	L	1.54	M	M	17.37	M	M
Mousavi	95	H	L	0.84	M	M	1.20	M	M	1.39	L	L	26.66	H	L
T. Mousavi	97	H	L	1.05	L	L	1.98	H	L	1.56	M	M	14.69	M	M
Molavi	339	H	L	0.83	L	L	1.52	H	L	1.36	L	L	40.35	H	L
Mirza-e Nazer	415	H	L	0.59	L	L	2.18	H	L	1.45	L	L	40.26	H	L

- Connectivity analysis: there is an inverse relationship between the connectivity of spaces and the degree of privacy. This means that the greater the connection between spaces, the less privacy. For analysis, from the table of findings about the connectivity of spaces of spaces, the minimum value has been selected because its values are within interpretable intervals.

- Analysis of Visual Entropy: the relationship between visual entropy and the level of privacy is a direct one. This means that as disorder increases, the visibility and readability reduces and the level of privacy increases. For analysis, the average value has been selected from the table of findings about visual entropy.

- Analysis of Circulation: there is an inverse relationship between movement circulation and the degree of privacy. In other words, the more movement circulation, the more visibility and readability, and hence, reduction of the level of privacy. For the analysis, the average value has been selected from the table of findings about motor circulation.

- Spatial Depth analysis: the relationship between spatial depth and privacy is a direct one. This means that as the depth of the space increases, accessibilty reduces and privacy improves. For analysis, the average value has been selected from the table of findings about spatial depth.

- Integrity analysis: the connectivity has an inverse relationship with the degree of privacy. This means that when spaces become more interconnected, the depth of the space and, as a result, the level of privacy will inevitably decrease. For analysis, the average value has been selected from the table of findings about connectivity. The comparison shows that both the simple method and the space syntax in most cases give similar results regarding the degree of privacy.

5. Discussion

The study conducted on the bodies of Mashhad houses during the transition period shows that:

A. The houses of Mashhad during the period of transition had an introverted spatial organization from the physical point of view, which the level of introversion of the houses was gradually (from the end of the Qajar period onwards) reduced.

B. Based on the conducted typology, Mashhad houses had three types of spatial organization during the transition period;

- Central organization (Bani Hashemi, Tavakkoli Zadeh, Sarvghad, and Mirza-e Nazer houses),

- Axial organization (Amiri, Hanasab, Rahimian, Malek, Tamaddoni, Rajaee, Mojtahed Zadeh, Talaat Mousavi, Tavakkoli, Salari, Molavi, Balkhast, Majidian, Behzadian, Talaee and Mousavi houses)
- Combined organization (axial-central) (Darougheh, Davoodi, Ghaffouri, Nazeran, and Barati houses).

C. In the spatial organization of Mashhad houses during the transition period, the internal-external pattern has been rarely used. In the studied sample size, only one case (Malek's house) followed such a pattern, and now the inner part of the house is destroyed.

D. In the houses of Mashhad during the transitional period, the yard was considered the shaping and organizing element of the spatial organization of the house, and with the passage of time and the change in lifestyle and the desire for extroversion, this role has gradually disappeared.

E. Since proximity to Imam Reza (AS) was considered a value for the residents of the city, in the houses of Mashhad during the transition period, the longitudinal axis of the land was chosen in such a way that the view of the main building was towards the Razavi's Shrine. However, proving this idea requires a more comprehensive study.

Research question. How has the space organization created the concept of privacy in the houses of Mashhad?

Answer: Documentary and field studies conducted on 25 houses belonging to the transition period in Mashhad show that a combination of several principles played a role in the formation of the spatial organization of the houses of this period to create privacy. Geometric shape and proportions; the characteristics of spaces, including function, hierarchy, zoning and confinement; the order of axes; the arrangement of the main mass and the arrangement of the mass and space, each in a way and to a certain extent, is of the most important features that have played a role in creating a degree of introversion and, as a result, creating privacy in the houses of Mashhad. The software analysis of Mashhad houses using the space syntax method also supports the mentioned hypothesis.

- Introversion: The current research shows that during the transition period, from Qajar to Pahlavi, the houses of Mashhad gradually moved away from introversion and showed some degree of extroversion. This finding is similar to most of the researches. The houses of Arak [30], Shiraz [31], Golestan [32], Kermanshah [33], Tabriz [34], Kerman [35], Dezful [36], Neyshabur [37], and many houses in other cities have gone through similar transformations, and only the houses of Kashan have been exempted from this transformation [38].

- Privacy: The degree of privacy of Mashhad houses during the transition period had a direct relationship with the degree of introversion of the houses. In other words, using the arrangement of mass and space for the benefit of introversion has been the key strategy of the architect to create privacy. In addition, the architect developed the level of privacy with the help of other principles such as hierarchy, lack of visibility (direct vision), zoning, and the number and position of entrances [39].

In similar studies, reseqrchers have listed factors of creating privacy. Zanganeh studying the houses in Shiraz considered introversion and hierarchy of access effective in creating privacy [40]. Pahlavan has introduced introversion, continuity of spaces, and attention to private space [zoning] as the factors of creating privacy in Ardabil houses [41]. Ebrahimi has mentioned the relative balance of open and closed spaces, spatial arrangement, physical introversion, and the pattern of the central courtyard as the factors that create privacy in Qazvin houses [42].

- Arena Separation: In most of the houses in Mashhad in both periods, the areas are divided into public, private, and semi-private zones, and the architect has employed this method to create and improve the privacy of the houses by increasing the depth and hierarchy of access. Adherence to the principle of zoning in the houses in Neyshabur (similar to the patterns used in the houses of Mashhad) is obviously seen [37], which seems to be a logical finding considering the proximity of this city to Mashhad. In a similar study, Zanganeh et al. have shown that the zoning in the Qajar houses in Shiraz has caused privacy in the houses and they believe that the level of privacy in the private area is more than that in the public area [40].

- Entrances: Qajar houses in Mashhad often (70%) had one entrance, and the houses of the first Pahlavi period mostly (60%) had two entrances. The entrance of most of the Qajar houses of Mashhad (92.4%) were into the building, and in most cases (80%) they entered the courtyard through the vestibule and corridor. In other words, by limiting the number of entrances and using elements such as vestibule and corridor, the architect has tried to eliminate the direct view into the courtyard in order to increase privacy. Most of the entrances of the first Pahlavi houses (42.3%) had a direct way to the yard by removing the vestibule and hallway, which

had a significant effect on increasing visual depth and reducing privacy.

The findings of the present research are consistent with the results of the study by Alimohammadi et al. on Qazvin houses. Based on the study, the privacy in Qazvin houses by using vestibule and corridor created a hierarchy that caused privacy and after the Qajar period, the entrance element was gradually removed and the entrance was directly connected to the courtyard [43]

Kakayi and Moztarzadeh listed the characteristics of the. entrance of Shiraz houses as location on a side alley, near one of the corners of the house, enclosed entrance, respect for hierarchy and introversion (indirect entry), and the absence of openings and windows [44]. These features, which are also present in the houses in Mashhad, are also seen in the entrance of traditional houses in Tehran [45].

6. Conclusion

The analysis of the subject through the studies shows that the change in the lifestyle of the people of Mashhad during the transition period has resulted in changes in the architecture of their houses. Among the most important social developments that took place at the level of society and in the people lifestyle was the discovery of hijab, which was also manifested in the mass-space system of Mashhad houses in an architectural way.

With the change in lifestyle and the redefinition of public and private areas, the entrances of houses also underwent changes. In fact, the entrances of Qajar houses that had a special hierarchy and space system to reach the yard; suddenly, in the first Pahlavi period, were transformed into entrances that led directly to the courtyard. This change made its way from the new way of life to the architectural body of the houses by reducing the element of privacy.

Another social development that caused a change in the body of architecture was the formation of new social classes (under the titles of military and civil people). The present study shows that the houses of the Qajar period were generally built on the same scale. In other words, the body of the house did not show much of the social class of its owner, and even the exterior of the house did not indicate this, except in special cases such as Malek's house, which have a unique pattern (internal, external) in the typology of Mashhad houses due to the frequent visits of people to them. It should be noted that this result is unique to Mashhad and similar studies on Qajar houses in other cities have different results. However, unlike the Qajar houses, it seems that the social classes formed as a result of Reza Shah new administrative order, and the resulting class differences can be observed in the architecture of the houses of the first Pahlavi period. Mousavi, Talaee, and Molavi houses were built in small scale; Majidian, Behzadian and Mojtahed Zadeh houses in medium scale; and the houses of Bani Hashemi, Tavakkoli Zadeh, Sarvghad, and Mirza-e Nazer built in large scale (so-called aristocratic houses) and on a large area of land.

In general, from the examination of the houses built in the transition period in Mashhad it can be observed that the political, social, and cultural changes in this city quickly and during a short period were represented in the architecture of the houses. Even the presence of an element as powerful as religion could not practically keep the sanctuary of the holy city away from major social changes and transformations (which were taking place at the country level).

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