

Study of perceptual geometry of the body of house: A case study - Houses of Qajar era in Tabriz

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ABSTRACT

This study does not only cover the historical aspects, but also analyze the sociocultural characteristics and seek to find the factors that affect the perceptual geometry of houses. Hence, the question is how the perceptual geometry is in the houses in Tabriz and which factors cause differences in the perceptual geometry of houses. 30 houses built during Qajar era in Tabriz are investigated and analyzed as case studies. Then, they are categorized according to their similarities and differences. Given the nature of subject, the present study is based on logical reasoning and adopts an interpretive-historical methodology with an approach to content analysis. So, in this study, the information is collected through library research and field investigations. A lot of valuable historical houses have survived in Tabriz, because the crown prince lived there in the Qajar dynasty, and, on the other hand, the city enjoyed economic prosperity due to the Silk Road. Differences are found based on the interpretation and analysis of perceptual geometry of Qajar houses in Tabriz, and it is eventually concluded that perceptual geometry of the houses is not the same, so the discussions about Qajar houses in Tabriz should not be generalized to the same category.

Keywords: Perceptual geometry; Social; Physical Form; Qajar Era; Tabriz.

INTRODUCTION

Spaces become more meaningful when they are perceived in architectural context. Perceptual geometry in homes involves the analysis of the influential factors for creating various home spaces. The study of the Qajar period seems noteworthy as a period in which, for the first time, Western architectural practices along with numerous features had adopted the Iranian architecture. Both political and economic factors, as well as perceptual components derived from sociocultural relations, are among the factors that influenced the geometry of Qajar houses, thus leading to an overall improvement in the art of architecture. Tabriz, which was destroyed by the 1193 earthquake, contained many buildings built in the Qajar era. The aim of this study is to show this Qajar perceptual geometry pattern in Tabriz.

The research begins with the question: 'How is perceptual geometry in Tabriz houses?' To answer such questions, we first studied the general characteristics of the traditional houses of Tabriz. Then, 30 houses, which are

related to Qajar period, were selected and studied further. The study criteria were based on differences and similarities between buildings, and the buildings were classified into three categories: the houses of businessmen, the houses of governors (martial and politicians), and the houses of ordinary people (other classes). Then, different spaces of the houses are studied according to perceptual components in architecture. The results of this section of our research show that although the houses are in a specific historical period, the political-economic and sociocultural factors affected the perceptual geometry of house spaces. Thus, houses were also classified according to the number of house entries, facades, decorations, and other features. Qajar era is full of conflicts in the architectural values and thoughts. Conflict and diversity in the field of architecture are mostly found in the residential realm. The entrance of the house is one of the evolutions in which the economic and social conditions have played an extremely important role (Ramezan Jamaat & Neyestani, 2011:74). Keinejad and Shirazi (2010) in the book 'Tabriz's Old Houses' have collected the physical features of houses of the Qajar period and investigated their evolution process. Harati (2010) explored spatial geometry of Kerman Historic Homes in her thesis titled 'Reconstruction of a house in the body of building.' She was trying to establish a harmony between a human and his/her environmental perceptions and to find out the physical and mental needs of the home and improve the quality, comfort, and fluentness of the home. The vernacular architecture of a country reflects its culture, religion, and identity. Researchers found that countries with similar culture and religion share few similarities in architecture (Chuki, et.al, 2017:113). Moradi et al. (2018) also studied the physical structure, patterns, and various species of the central courtyard in the city of Tabriz. Sociocultural changes are influential factors on housing, which have affected the housing in different periods, according to Assadi (2001), "perceptual geometry attempts to answer fundamental questions in perception form and representation of space through the synthesis of cognitive and biological theories of visual perception with geometric theories of the physical world" (Assadi, 2001: 59). So far, a lot of research has been carried on the geometry of houses and how they are designed. However, the discussions are mainly about the types of geometry that have been discussed so far. These include the geometric relationships between the various parts of the house, such as the visual and proportional geometry that shows up in elevations, axes, and other dimensions.

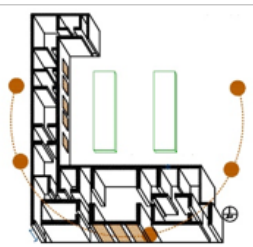
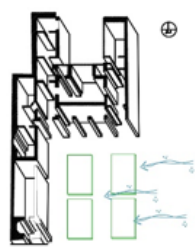
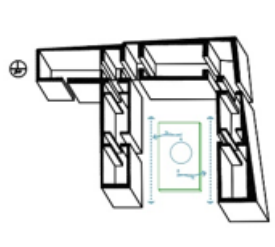
Although traditional houses contain geometries, perceptual geometry is not visible and cannot be drawn geometrically but depends on the perception of the visitor. During the Qajar period, various factors have influenced the architecture of houses, which, depending on the degree of change and its impact on different people, have created houses with different perceptual geometry. According to the past investigations on Tabriz historic homes background, all the focus was on the physical geometry, and no attention was given to the behavioral features. All the investigations on Tabriz historic homes are referring to each other. For this reason, the study of geometry of houses is examined physically and behaviorally. For the first time, the differences between these houses are investigated according to perceptual geometry, and a classification is given. Hence, a new classification of Tabriz Qajar homes perceptual geometry is represented, which can be a base for future research.

PERCEPTUAL GEOMETRY

According to scientific explorations in understanding geometry as well as combining the various foundations of cognitive perceptions such as environmental psychology, mathematics, and other related sciences, even the religious sciences, nature scenes are systematically used as visual stimuli and influencer in this regard [3]. A clear meaning that can be expressed in terms of the geometry of perception in relation to the subject of the present work is the cause-and-effect relations, which, in an organized system, is a factor in the juxtaposition of relations and is completely indistinguishable at the initial to intermediate levels. Therefore, it should be concluded according to the needs and happenings of the specific time. Geometry is a mystery that has the essence of the work in itself and is a common soul in every architectural style (Hojjat & Maleki, 2013). Architecture, like a language, transmits messages. These messages come to us from the physical dimensions of buildings, and they get meanings in our minds. When this information gets meaning in our mind, a perception of the building is created in us (Behboudi, 2014). The perceptual aspect, which is related to the relationships of each ethnic culture, is as well influenced by numerous social and

individual factors. Then, the perceptual geometry is an attempt to answer the fundamental issues in perceiving the forms (Farshchian & Balali Oskuei, 2015). Furthermore, perceptual geometry is a key element in creating a relationship between the building and the ideas that the maker had in mind. In terms of external performance, geometry is the science for choosing the dimensions of buildings and the various factors of the residents' behavior. For a traditional architect, geometric patterns have beauty and harmony (Hejazi, 2009: 24). Paying attention to the residents' sociocultural characteristics and period of construction of the buildings according to sociopolitical characteristics of the society results in recognition of perceptual geometry of body of the houses (Table 1).

Table1. Different Geometry in Tabriz house (Researchers).

		
<p>Amir Kabir House</p>	<p>Bolurchiyan House</p>	<p>Haj shaykh House</p>

FACTORS INFLUENCING THE ARCHITECTURE OF THE HOUSES OF QAJAR PERIOD

In each historical period, the features of the society in that period had an impact on architecture. The Qajar period is the period of conflict in the values and architectural ideas and variation in urban architecture trends and practices (Ramezan Jamaat & Neyestani, 2011). Following the dramatic changes brought about by factors such as the industrial revolution, the political, social, economic, and cultural changes in Europe (Habibi, 2009: 234), Iran's military defeats, colonialism, affiliated trade, sending students to Europe, employing European engineers and specialists, etc. (Adamiat, 1975), architecture of houses in the Qajar period has undergone many changes. Houses that were formed based on the beliefs of the inhabitants and their lifestyle gradually changed (Alizadeh, 2012). Political-economic and sociocultural factors are among the factors influencing the perceptual geometry of Qajar houses in Tabriz city (Fig 1), which have been investigated.

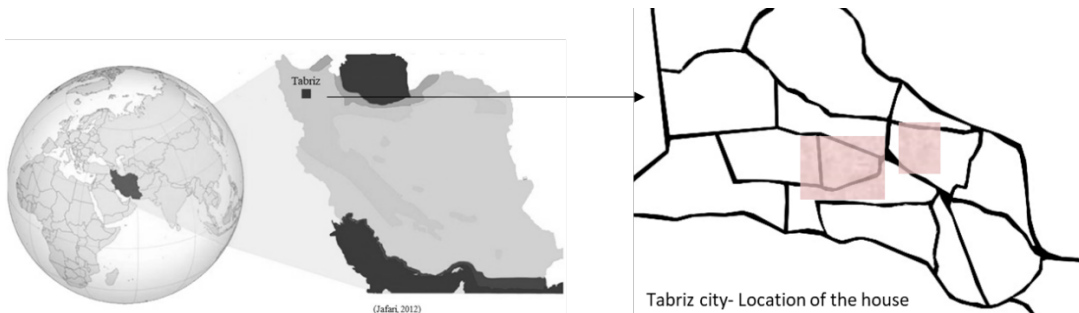


Figure 1. Tabriz city Situation.

(https://www.nouahsark.com/en/infocenter/worldwide/asia/iran/iran_location)

In the Qajar era, the government and the relatives were united with each other and formed part of the ruling social class. Dependence on foreign wealth and dominance of the government on the society were imposed on the material and spiritual well-being of various groups and social classes (Fouran, 1999). In Qajar era, the king or governor was in the head of the pyramid of economic and political power, which is governed by organizations and personal relations. The personalization of politics and the accumulation of power in the presence of a person eventually led to an informal person. The king was more and more assisted by his relatives in decision-making processes (Allen Bill, 2008). Thus, domination by personal will by the highest authority, the king, the ruler, or any other title is determined. The ruler was free of all the constraints of the traditional system, and therefore, instead of the exercise of official and legal authority, loyal relations and affiliations formed the network of the main form of government communication (Freund, 1988). On the other hand, due to global developments and the increase of economic and political relations as well as Iran's presence in the world economic system, there were major evolutions in the country. These developments led to the formation of a new customs structure in Iran and a relative increase in customs revenues from the pre-Qajar era but failed to provide the necessary means for economic and financial prosperity of the country. As a result, the profits from these developments were mostly attributed to the superpower countries and countries that had impact on Iran (Saeedinia, 2009).

The beginning of the Qajar government with the mechanisms of political power in Iran in the early nineteenth century came only a few years after the French Revolution, which meant the continuation of the principles of political thinking, components of social identity, and cultural background despite Iran's entry into global change and the beginning of the era of Iran's coincidence with the Europe of nineteenth century (Ahmadzadeh, 2015). According to the documents and texts of different writers, power, wealth, and dignity in Iranian society of Qajar era are a kind of system and power ruling of the traditional type in which the ruler or the king was considered absolute power. In such a community, power resulted in wealth and dignity.

Therefore, the classes associated with this divine power, such as princes, women of harem and courtiers, and even some merchants and clerics, because of their attachment to this center of power, enjoyed the benefits of this power, namely, the acquisition of wealth and dignity. However, people from the community who were far from this center and did not have any affiliation and who, according to the existing traditions, condemned themselves to accept such a government did not enjoy much power and wealth (Javdani, 2014). The presence of women in paintings of the homes reflects the new cultural identity in this period. More Iran's contact with Europe (Ansari, 1971:280), the influence of foreigners and their propaganda (Pirnia, 1990:270), the presence of teachers, engineers, and architects in the Darulfonoun school (Habibi, 2009:238), and the tendency toward appearances and showing off (Asefi & Imani, 2014) are among the most influential cultural elements in this period.

THE HOUSES OF MERCHANTS

The bazaar of Tabriz city was popular due to its location on the Silk Road. The merchants were among the most important social classes that many of their houses remained. This group was among the wealthiest in the city, and the abundance of wealth and their occupation has affected the appearance of their homes. Based on field studies, these have affected the size, number of stories, and number of entries, height, and decorations. According to our research, merchants' houses were with an average area of 1520 square meters. Despite their vastness (having nested Interiors), the connection between their parts and the outside was established by an entrance that was associated with a vestibule. There are some waiting and sitting spots in inner and outer parts, which were used by strangers and guests. The vestibule in merchants' houses was much more luxurious and had more beautiful decorations than other houses. Five-doored rooms, which were considered as guest rooms, were located near the Tanabi and were a semipublic space among private space. In merchants' houses, Tanabi consisted of stunning Shahneshins. The balconies in these houses had beautiful plaster ornaments and were not decorated with pediment above them. Despite the wealth of the families, interior decoration (Fig. 2) of the houses included plaster and paintings (flower and bushes). The housing methods of

ANALYSIS OF DATA

Studying physical characteristics requires studying activities of the considered space, and perception is considered as a part of the general category of interaction between individuals and the real environment (Stokols, 1987). Thus, the characteristics of three different types of houses (governors, merchants, and ordinary people) could be indicated by analyzing the activities in the spaces (social and cultural activities). Macro-scale physical features (such as spatial organization, hierarchy, privacy, symmetry, and facade) and micro-scale physical features (such as the entrance, the courtyard, the Tanabi, and Pastu like closet or back part of a shop) and five-doored rooms are stated in Table 5.

Table 5. Different part of the Qajar house (Researchers).

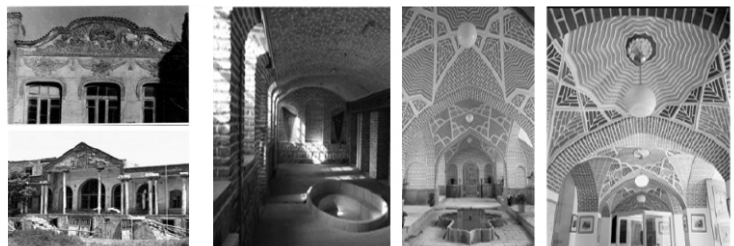
<p>Hajab's house</p>	<p>Bolurchiyan's house</p>	<p>Sorkey's house</p>

The difference in façade



Boromand and Khiabani's House
Khataei and Behnam's House

The difference in interior



Hariri and Amir Nezam's House
Sehat's House
Gadaki's House
Kozeh kanani's House

Figure 5. The difference between houses in terms of spring house and façade (photo: from register and document cultural heritage of Tabriz).

As the study shows, hierarchy and privacy do exist in all three types of houses, and symmetry is mainly seen in their facades and appearance. Governors' houses mostly entailed a facade with pediments, while the houses of merchants and ordinary people follow the Isfahan style. Spring house is another matter that had been affected by the economic situation of the society. In the spatial organization of houses, there have always been three spaces (open, closed, and semiopen) (Table 6).

Table 6. Studying perceptual geometry of areas based on spatial-physical (Researchers).

	Ordinary Peoples' Houses		Merchants' Houses		Governors' Houses	
	Hajab	Dr. Sahati	Ghadaki	Bolurchiyan	Sorkey	Amir Kabir
spatial						
hierarchy						
privacy						
symmetry						
facade						
Location						

Organization of the differences between the behavioral characteristics of different parts of houses such as vestibule, Tanabi, and other spaces is as follows. The entrance of governors' houses was from the outer courtyard and was carried out directly without an interface space, while the second entrance, which leads to the Tanabi, had an interface space, which was formed in order to preserve privacy of interior parts. In some houses, the third entrance leads to the interior, and just as the second entrance, it included an interface space. Therefore, the entrances fit the residents' rank, beliefs, and needs (Ramezan Jamaat & Neyestani, 2011). Governors' houses were houses of

combined style. Accordingly, in merchants' houses clients were not let in, and they had to wait in vestibule. However, in governors' houses, due to numerous commutes of people and strangers, the entrance from the courtyard leads to Tanabi, and this entrance was associated with no vestibules. Pastu was either on two sides of shahneshin or near the Tanabi for storing supplies. The difference among Pastues in the three types of houses is stated in Table 7. Because of holding parties and ceremonies in houses, the positioning of Pastu was different. The Tanabi had two forms (one that included a shahneshin, and another that did not). Five-doored rooms were of two types. The first type, which was geometrically located near the Tanabi, was considered as guest room, and the second type, which was in the interior, was considered as the living room. The entrance to the Tanabi was through surrounding spaces such as hallway and balcony.

Table 7. Studying the perceptual geometry of interior spaces in houses of governors, merchants, and ordinary people (Researchers).

	Ordinary Peoples' Houses		Merchants' Houses		Governors' Houses	
	Hajab House	Dr. Sahati House	Ghadaki House	Bolurchiyan House	Sorkey House	Amir Kabir House
Entrance						
Courtyard						
Tanabi						
Five-Doored Room						
Pastu						

CONCLUSION

The formation of traditional houses geometry is deeply related to the needs and lifestyle of the people. The study of different types of traditional houses in Tabriz in a specific historical period with the same climatic conditions shows the existence of cultural-social and political-economic differences in the society. By analyzing the perceptual geometry of Qajar houses in Tabriz city, the results of the research indicate that the houses are not the same and that all houses cannot be generalized in a general category. So, with the surveys done, we conclude that three groups of governors, merchants, and ordinary people were the three main dominant groups of the community, whose houses differ from each other in terms of spatial and physical organization. This comes from the impact of political, economic, and social-cultural factors.

Politically, since the king was interested in European architecture, governors built their houses based on the king’s interest to strengthen their bond with the court and to get promoted. The crown princes and Qajar families were living in Tabriz, and they made their houses built in accordance with the king’s interest. Political factors have had more effects on the shape of governors’ houses among all. Culturally, traveling to the West (Europe) contributed to people showing-off and to the tendency of appearance. The houses of the governors were the first to be influenced by modernism because of traveling abroad and having ties with the court. The pediment in the main view (on top of the balcony, which was in front of the Tanabi) is a result of this. The mirror decoration, which is one of the achievements of the Qajar era, was seen in the governors’ houses of the Qajar dynasty. Most of these decorations were in the interior spaces and on the roof of Tanabi. The subject of the paintings in Tanabi was the king’s overseas travels and women. Since economy boomed in this period, and Tabriz was renowned as a commercial city, economic factors have had great effects. So, many merchants used to live in Tabriz. They used to build their houses as bigger and more magnificent houses. Although economic factors have had great effects on merchants’ houses, they were following the Isfahani style. The social factor was another factor affecting houses. In the Qajar era, peoples’ houses were based on social status, and this has been posed by displaying power and wealth in the house and the ornaments. The ordinary people’s homes were much simpler, with less space than other homes, which was because of the average economic and social status. Also, they were less influenced by politics than others. In Table 8, physical findings of different houses are analyzed.

Table 8. Physical findings of different houses are analyzed (Researchers).

Descriptions	Houses	Area	Floors	Entrance	Vestibule	Courtyard	Style	Decoration	Analysis			
									political	Economic	Social	cultural
The economy has had a huge impact on merchants’ houses than other homes. And at the next level, the socio-cultural component had the same effect, and the political component had less impact than the other two components.	Merchants	1520m ²	3-2	1		Inner and outer	Isfahani	Gilding, painting, mirror				
Political component was the most important component in the governors’ homes and the next component in importance was economics. Social and cultural components were less important.	Governors	1000 m ²	3-2	3-2		Inner and outer	Fusion	Gilding, painting, mirrors				
In the ordinary people’s homes, society and culture had more influence than the political and economic components.	Ordinary people	730 m ²	1-2	2-1		Inner and outer	Isfahani	Brick and gypsum				

REFERENCES

- Assadi, A.H. 2001.** 'Perceptual Geometry of Space and Form: Visual Perception of Natural Scenes and Their Virtual Representation', Proceedings of SPIE - The International Society for Optical Engineering. 4476: 59-72
- Allen Bill, J. 2008.** History of Contemporary Iran: 20 Policies in Iran (groups, classes and renovation), Translated by Ali Morshedizad. Tehran: Akhtaran.
- Adamiat, F. 1975.** Amirkabir and Iran, Tehran, Kharazmi.
- Ahmadzadeh, M.A. 2015.** A Narrative of Socio-Political Identity of Iran in Historical Resources of the Qajar Dynasty. Institute for Humanities and Cultural Studies, 5: 1-25
- Ansari, M.N. 1971.** A Review of Iranian Architecture, Tehran, Academy of High Education.
- Asefi, M. & Imani, E. 2014.** Recognition and Evaluation of the Transformational Factors of the Spirit of Iranian Traditional Architecture: Originality of the Past, Novelty of Today, Hoviatsahr, 8: 63-76.
- Behboudi, R. 2014.** Perception in Architecture Measuring European Tourists, Perception towards Isfahan's Iranian-Islamic Architecture, Honar-Ha-Ye-Ziba, 17: 41-48
- Farshchian, A. H. & Balali Oskuei, A. 2015.** Manifestation of perceptual geometry in the development of Iranian cities in history (case study: the city of Hamadan). Motaleate shahri. 4: 53-68
- Freund, J. 1988.** Sociology of Max Weber, New York, Pantheon Books.
- Fouran, J. 1999.** The Fragile Resistance (History of Social Changes in Iran from the Safavid Dynasty to the Years after the Islamic Revolution, Translated by Ahmad Tadayon, Tehran, Rasa Institute of Cultural Services.
- Jafari, M. 2012.** Forests genetic resources in Iran. <http://www.fao.org/3/i3825e/i3825e34.pdf>, (March 17.2012).
- Javdani, E. 2014.** Ornamental Arrays in Qajar Clothes from the Perspective of Max Weber's Theory on Social Inequality (Case Study: Jewelries, Paisley patterns and Badges), Master's thesis, Tehran University of Science and Culture.
- Hojjat, I., & Maleki, M. 2013.** Convergence of Three Fundamental Geometric Types & Genesis of the Persian Mosque's Geometry, Honar-Ha-Ye-Ziba, 17: 1-14.
- Hejazi, M. 2009.** Sacred Geometry in Nature and Architecture of Iran', History of Scienceournal, 6:15-36
- Habibi, S. H. 1999.** Isfahan School, Qajar Dynasty and Tehran Style, Proceedings of the 2nd Congress of Iranian Architecture and Urbanization, 2: 234-235.
- Habibi, S. H. 2009.** 'The Evolution of Iranian Contemporary Architecture and Urbanization', (Tehran, Azar, 2009).
- Pirnia, M.K. 1990.** Iranian Architectural Approaches, Collected by Gholam H Memarian, Tehran, Institute of Islamic Art Publications.
- Ramezan Jamaat, M. & Neyestani, J. 2011.** The Manifestations of Modernity and Tradition in the Entrance Spaces of Houses in Tehran in Qajar Era, Honar-Ha-Ye-Ziba, 2: 65-76.
- Stokols, D. & Altman, I. 1987.** Handbook of Environmental Psychology, New York, Wiley Publision.
- Saeedinia, H. 2009.** Historical changes of the Iranian Customs and Economic Prosperity in the Qajar Dynasty, Journal of History of Iran, 5: 103-127.
- 'DAR UL-FUNUN SCHOOL', (Agu 8, 2020),** <https://www.itto.org/iran/photogallery/dar-ol-funun-school-tehran/>
- Juei Bridge, (Agu 8, 2020),** <https://isfahaninfo.com/juei-bridge>