Study of perceptual geometry of the body of house (Case study: houses of Qajar era in Tabriz)

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Abstract

This study is not only covers the historical aspects, but also analyzes the socio-cultural characteristics and seeks to find the factors which affect the perceptual geometry of houses. Hence the question is that 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. 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 socio-cultural 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. Tha 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 socio-cultural 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 has played a very 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) explores 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 human and his/her environmental perceptions, and to find out the
physical and mental needs of the home, improve the quality, comfort and fluency 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. Socio-cultural changes are influential factors on housing, which have affected the housing in different periods. Also, according to the Assadi (2001), “Perceptual geometry attempts to answer fundamental questions in perception form and representation of space through 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 mostly about the kinds of geometry which have been discussed so far. This includes geometric relationships among different parts of the house, as well as visual and proportional geometry that can be seen 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 of the focuses were on the physical geometry and no attention was given to the behavioral features. All the investigations on Tabriz historic homes are referred 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. 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, 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).
Table 1. Different Geometry in Tabriz house, (Researchers)

<table>
<thead>
<tr>
<th>Amir Kabir House</th>
<th>Bolurchiyan House</th>
<th>Haj shaykh House</th>
</tr>
</thead>
</table>

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: Political-economic factors and sociocultural factors.

Figure 1. Tabriz city Situation

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 head of the pyramid of economic and political power and 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, or the ruler, or any other title is determined. He 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, 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 is 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 is a reflection of 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 was one of 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 which was associated with a vestibule. There are some waiting and sitting spots in inner and outer parts, which was being 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 semi-public space among private space. In merchants’ houses, Tanabi was 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 previous dynasties have mostly been performed in these houses and modernization has not influenced them. Talking of height, although having low building height is necessary in the cold climate of Tabriz, merchants’ houses included rooms with great heights. Physical features in these houses are stated in Table 2.

Figure 2. Studying the interior decorations in merchants’ houses (From register and document cultural heritage of Tabriz)

Table 2. Physical Features of Merchants’ Houses, (Researchers)
The Houses of Governors

Crown princes and many Qajar families used to live in Tabriz city during the Qajar monarchy. The houses of this social class have mainly followed modernization. Modernism and the actions taken by reformists and intellectuals and the admission of them by the court and nobility were considered in the Qajar era (Habibi, 2009). They also have influenced housing. That is, as we approach the third period, decorations and house plans are more changed according to the behavioral patterns. According to the field surveys done at governors’ houses regarding the number of entries, these houses had two or three entrances. One of these entrances lead to the outer courtyard, another one lead to the inner courtyard (through a hallway or intermediary place), and the other lead to the Tanabi. In most of the houses which were studied, the entrance from exterior to interior had no vestibules. These houses were with an average area of 1000 square meters. They were mainly consisted of two or three stories and their facade often included pediment. Besides, the interior decorations (Tanabi) were inspired by some topics such as Naser al-Din Shah’s overseas travels and women. Decorating with mirrors was also seen at governors’ houses. This could be the result of excessive use of these kinds of ornaments in Qajar palaces (such as Golestan palace). Some of the decorations used in the governors’ houses are shown in fig 3.

Figure 3. Studying the interior decorations in governors’ houses (From register and document cultural heritage of Tabriz)
Table 3. Physical Features of Governors’ Houses, (Researchers)

The Houses of the Ordinary People

The other Qajar houses in Tabriz, which remained and do not belong to the specific social classes, are attributed to ordinary people. The dominant area of these houses is less than the area of other houses (approximately 730 square meters). They were mainly consisted of one single story and sometimes two stories. They also had two courtyards. The outer courtyard was bigger than the inner one. In addition, these houses had averagely 5 rooms. Instead of paintings and mirrors, their decorations were made of brick and plaster. In these houses, the vestibule was in the shape of a square or an octagon. Also, it was simpler than the ones in merchants’ houses (Fig 4). The Tanabies (main hall) also had fewer decorations than other houses. Most of these factors indicate the economic status of the people compared to others as shown in table
Figure 4. Studying The Interior Decorations in The Houses of the Ordinary People’ Houses, (Researchers)

Table 4. Physical Features of the Houses of the Ordinary People, (Researchers)

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Physical specifications</th>
<th>Relation Of Spaces</th>
<th>Decorations</th>
</tr>
</thead>
<tbody>
<tr>
<td>House</td>
<td>Number Of Rooms</td>
<td>Yard</td>
<td>Terrace</td>
</tr>
<tr>
<td>Bromand House</td>
<td>1000</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Khiyabani House</td>
<td>300</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Decorative House</td>
<td>500</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Nezami Darvish House</td>
<td>700</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Nezami House</td>
<td>400</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Nezami House</td>
<td>650</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Nezami House</td>
<td>1600</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nezami House</td>
<td>1000</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

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, Pastu (like closet or back part of a shop) and five-doored room are stated in table 5.
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 which had been affected by the economic situations of the society. In the spatial organization of houses, there have always been three spaces (open, closed and semi-open). (Table 6).

**Table 5.** Different part of the Qajar House, (Researchers)

<table>
<thead>
<tr>
<th>Ordinary People’s Houses</th>
<th>Merchants’ Houses</th>
<th>Governors’ Houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hajab</td>
<td>Dr. Sahati</td>
<td>Ghadaki</td>
</tr>
<tr>
<td>Bolurchiyan</td>
<td>Sorkey</td>
<td>Amir Kabir</td>
</tr>
<tr>
<td>Spatial organization</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.** The Difference Between Houses in Terms of Spring House and Façade (photo: From register and document cultural heritage of Tabriz)
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 lead to the Tanabi, had an interface space, which was formed in order to preserve privacy of interior parts. In some houses, the third entrance lead 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 lead 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 are stated in table 7. Because of holding parties and ceremonies in houses, the positioning of Pastu was different. The Tanabi had two forms (the one which included a shahneshin, and the one which did not). Five-doored room was 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.
**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 in order 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 located in the interior spaces and on the roof of Tanabi. The subject of the paintings in Tanabi were 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 a bigger and more magnificent house. Although economic factors have had great effects in merchants’ houses, they were following the Isfahan 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)
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