A Syntactic Approach to the Effect and the Role of *Hayat* and *Riwaq* in the Geometric Conception of Traditional Housing Architecture in Iran: Tabriz Houses


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Abstract: *In this study, the open and semi-open spaces of the traditional houses of Iran's Tabriz city in last two hundred years are analyzed.* Hayat (court) *is an open area that establishes the relationship between all the spaces of the house, arranges the functional spaces around it, and facilitates the transition between surrounding places. The role of* hayat *in the spatial organization of the houses will be discussed by focusing on its syntactic characteristics. Syntactic values of house spaces are depth, integration, circularity and isovist values. The aim of the study is to examine the role of "hayat" and "riwaq" in traditional Tabriz houses in the tradition of the central space and in design, in the light of the results obtained from the analyses of the plans of the selected houses. The work reveals the importance of these open and semi-open spaces over other spaces in terms of syntactic characteristics and the spatial sequence. Another point is to examine the influence of these spaces on the geometric understanding of the traditional architecture of Tabriz.* Hayat*,* eyvan *and* riwaq *are important architectural spaces that are often seen in important items of the city such as bazar, madrasah and caravanserai. The present study is supported from the results of ongoing doctoral thesis research at the Graduate School of Science, Engineering and Technology of Istanbul Technical University. Within the scope of the thesis, the evolution of the main living space from the traditional houses of Tabriz to the present apartments is analyzed syntactically. In the research presented here, only the results of the syntactic schemes are presented using the "Spatial Syntax" method.*

Keywords: *Tabriz, Traditional Houses, Hayat, Riwaq, Space Syntax.*

Hayat ve *Revak*'ın İran Geleneksel Konut Mimarisinin Geometrik Anlayışındaki Etkisi ve Rolü Üzerine Sentaktik Bir Yaklaşım: Tebriz Evleri Örneği

Özet: *Bu çalışmada İran'ın Tebriz kentinin iki yüz senelik geleneksel evlerinin açık ve yarı açık mekânları irdelenmektedir. Hayat, evin diğer ögeleri arasındaki ilişkiyi kuran, evin işlevsel hacimlerini düzenleyen ve etrafında konumlanan mekânlara geçişi sağlayan bir mekândır. Bu özellikleri ile hayatın evin mekânsal dizimindeki rolü irdelenmektedir. Analizlerde ev mekânlarının derinlik, bütünleşme, döngüsellik (merkezilik) ve eşgörüş gibi sentaktik değerleri elde edilmiştir. Çalışmanın hedefi seçilen evlerin planlarına uygulanan analizler sonucundan elde edilen veriler ışığında, hayat ve revakın geleneksel Tebriz evlerinde merkezi mekân geleneğinin ve kurgusun içindeki rolünü irdelemektir. Bu açık geçiş mekânlarının diğer mekânlara göre sentaktik özellikleri ve mekânsal dizimdeki önemi ortaya konmaktadır. Diğer bir husus ise bu mekânların Tebriz'in geleneksel mimarisinin geometrik anlayışındaki etkisi ve rolünü irdelemektir. Nitekim hayat, eyvan ve revak; bazar, medrese ve kervansaray gibi kentin önemli ögelerinde de sıkça kullanıldığı görülen mimari ögelerdir. Bu çalışmada bu ögelerin "Tebriz'in geleneksel konut mimarisinin de ana ögeleri olduğu kabul edilebilir mi?" sorusuna cevap*

aranmaktadır. Sunulan çalışmada İTÜ Fen Bilimleri Enstitüsü'nde devam eden doktora tez araştırmasının sonuçlarından yararlanılmıştır. Tez kapsamında Tebriz'in geleneksel evlerinden günümüz apartmanlarına kadar uzanan geçiş sürecinde ana yaşam mekânının evrimi sentaktik olarak irdelenmektedir. Burada sunulan çalışmada ise sadece geleneksel evlerde "Mekânsal Dizim" yöntemi kullanılarak sentaktik analizler şemalar üzerinden tartışılmaktadır.

Anahtar kelimeler: *Geleneksel Tebriz Evleri, Hayat, Revak, Mekânsal Dizim*

1. INTRODUCTION

Tabriz city lies in the center of Eastern Azerbaijan Province in the northwestern region of Iran. The traditional residential architecture of Tabriz persisted for many years, and until the Pahlavi period in the early twentieth century, the city's traditional texture and architecture had not changed. The architecture came into being in accordance with the demands of traditional lifestyle and did not change dramatically. An exploration of the houses of the north-western part of Iran, and Tabriz houses in particular, can give clues to shed light on the relationship between traditional residential architecture of Eastern and Southeastern Anatolia, Iraq and Syria. In this context, the findings and conclusions that will be reached through the analyses of Tabriz traditional housing architecture can actually help in revealing the general and common characteristics of traditional housing architecture in a larger region covering Azerbaijan, Eastern and Southeastern Anatolia and Mesopotamia.

When the residential architecture of Iran, and especially that of Tabriz is examined, the most important feature of the overall character is the tradition of introversion and the use of a central space in the spatial configuration. This characteristic is a traditional feature that has emerged from the region's climate and the local society's sense of privacy. Traditional houses usually have one or two floors. They also have basements used as pool rooms for relief in high summer temperatures. Additionally, a kitchen, and service and storage rooms are located on the basement floor under all of the building or covering a part of the building's basement. This tradition of introversion and central space in Iranian residential architecture continued until the early 20th century, but disappeared during the process of building the apartments. Thus, *riwaq* as a portico and semi-open transition space has lost its function and importance in contemporary Tabriz houses (Figure 1).

Figure 1. An example of privacy and introversion in the Traditional Tabriz Houses of the 1920s [20].

Hayat (court) and *riwaq* (portico) in Iran, and in the traditional life of Tabriz in particular, are the main spaces where households sleep and rest, and on special religious days they are used for cooking. People who come to the house from the outside are firstly hosted there too, so these spaces are used both as social and recreational spaces. These spaces provide contiguous and gradual transitions from outside and from public areas into the area devoted to private life. Therefore, they help households to control the level of privacy. On the other hand, *hayat* brings the people of the house together with the natural world, and in the same way, it ushers natural light and fresh air into other living spaces. This study will discuss the characteristics of *hayat* and *riwaq* in traditional Tabriz houses and how they organize the connection between the other spaces.

Methodologically, the present study will focus on the syntactical values of the spaces, obtained as a result of analyses conducted of the plan schemes using the spatial syntax method. There are studies of traditional Tabriz houses which mostly emphasize the structural and climatic features, however the syntactical approach has not been used in the studies of traditional houses of Tabriz. The graph analysis method was used in the housing studies of Memarian and Nezhad in their deliberative analyses of Kashan, Yazd, Shiraz and Ardebil houses, and only the depth and the integration values of the places were examined [1, 2].

2. SOCIAL LIFE AND SPACE SYNTAX

The space where the family lives in the traditional lifestyle of Tabriz forms a nexus of important socio-cultural factors. Family ties are the basis of the social communication. Occupational and economic relations do play a major role in the formation of city districts but nevertheless family ties and social relations have the most important role. In this context, the development of traditional houses was driven by the marriages of family members which caused the formation of new core families. As such houses were often built side by side and over time, in this way neighborhoods grew up.

The study is founded on the theoretical background of the socio-cultural structures and residential space syntax studies, and relations between human behaviors and space are examined through space syntax theories. It provides a syntactical analysis of how social and cultural factors influence the relationship between housing morphology and spatial artefacts. The techniques of measuring, symbolizing and interpreting the spatial configuration in buildings are defined as space syntax [3, 4]. The morphological structure of the building emerges from plans that use space syntax methods. Integration, depth, isovist and circularity are the basic syntactic parameters measured in all plans. Numerous researchers have studied housing through different disciplines and different perspectives [1, 2, 5, 6, 7, 8].

3. THE IMPORTANCE OF HAYAT AND RIWAQ

Tabriz houses are surrounded by high walls, and the social life is generally introverted. The surrounding walls are also intended to protect the food produced and stored by the family in the inner areas, from outside. These walls prevent the front door of the house from opening directly into the street. The house has been arranged in a way that enables the women to work, rest and have social relations comfortably. Thus, the rooms where everyday life takes place and where the guests are welcomed, in other words, the places where private, semi-private and public life occur, are separated in Tabriz houses. In this context, transition spaces that provide the passage and connection between spaces are important since they provide the spatial hierarchy required for privacy in the dwelling. In general, the concept of “privacy” refers to things that exist at the deepest level of a person. Various authors attempted to explain the term privacy by various concepts such as “withdrawal” [9], “limits of the power of others on individual [10]**,** “personal control” [11], “the process of organizing interactions between people” [12], and 'the total appearance of spaces that regulate and control the interaction between people” [13].

Rapoport [14] defines the limit of living space as "threshold". The threshold, a place between public and private spaces, is a position or line, sometimes physically visible, and at times unseen, that foreigners cannot cross without permission. Spaces located around *hayat,* the most important section in Tabriz traditional houses, are placed according to their privacy levels. Living rooms and bedrooms are located behind guest rooms, and there are transition spaces such as *riwaq*, *dehliz* (vestibule) and corridor in between. Even though the bedrooms in houses with single *hayat* are located around the courtyard with a guest room facing *hayat*, there is still a transition space between *hayat* and the room. Thus, it is ensured that passage to private spaces is controlled. Women and family life is private, so life is maintained in a closed space. In addition to the need for a cool climate, the walls of Tabriz houses are often elevated due to the conception of privacy nourished by religious and traditional beliefs, and it requires that the house is protected from outside. The courtyard wall is the threshold between private and public spaces. Entrance to the building is carried out via *hashti* (entrance hall of the building) and *dalan* (the passage corridor to the garden), so that visual and audio privacy are also ensured (Figure 3).

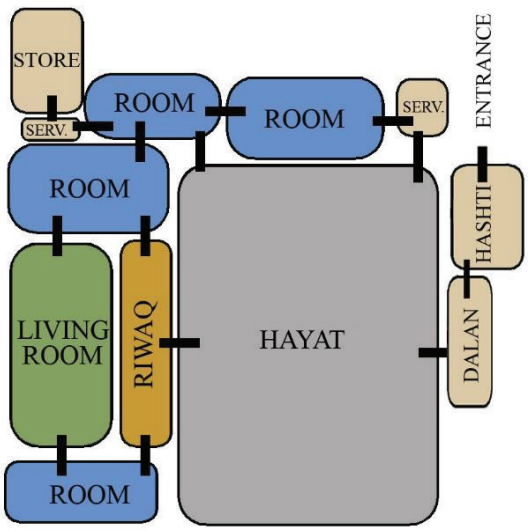

Figure 3. Diagram of configuration of the Alavi house

The symbolic meanings that *hayat* represent in Iranian houses are as follows:

- *Hayat* is the boundary that sets the limits of a house, and it prohibits the entry of strangers.
- *Hayat* unifies living spaces and provides communication between inside and outside.
- *Hayat* creates a cheerful, green and peaceful place for family.
- *Hayat* provides fresh air circulation.
- *Hayat* is an important element that organizes various spaces.

Another important semi open space is *eyvan*. The word “eyvan” in Persian, “eyvan” and “ayvan” in Turkish, and “iywan” or “van” in Arabic come from the word “ban”, which means “house” in Pahlavi Persian, and it is believed that this word passed from Persian to Arabic [15]. It is known as “sofa” in Anatolia, “tarma” in Iraq, and “riwaq” in Syria, according to Ünlü’s study [8, 16, 17] in Northern Mesopotamia houses. It is a multifunctional transition space between private and semi-public areas of houses, a food preparation and eating area where everyday life takes place [16].

In the Dehkhoda dictionary, the words “eyvan”, “sofa” in the form of crescent, and “mehrab” share the same meaning, while they are also used to refer to a long corridor, a living room, open houses and sitting rooms for the sultans. The word “eyvan” is used in the works of famous poets such as Ferdowsi, Manuchehri, Naser Khosro, Nizami and Khagani. “Pish eyvan” (fore-iwan) also denotes to a sofa situated at a higher place in an open space. [18] According to Ardalan [19] “eyvan” also has transcendental implications. In a different way, he describes *hayat* as the spirit and the rooms as the body of the house, and thinks that *eyvan* marks a transition area between these two worlds. Ardalan [19] argues that Iran's traditional architecture is in a dilemma. He claims that there is a transition between cultural and religious concepts as social factors which he defines as essence, and material, color and texture as physical factors [19].

Having the three sides closed, *eyvan* is usually covered with a vault positioned at the center of the building overlooking the courtyard. Firstly, it is used in homes in Mesopotamia and Central Asia, the feature is considered to be the most important element in mosque, caravansarai and madrasa buildings (Figure 4).

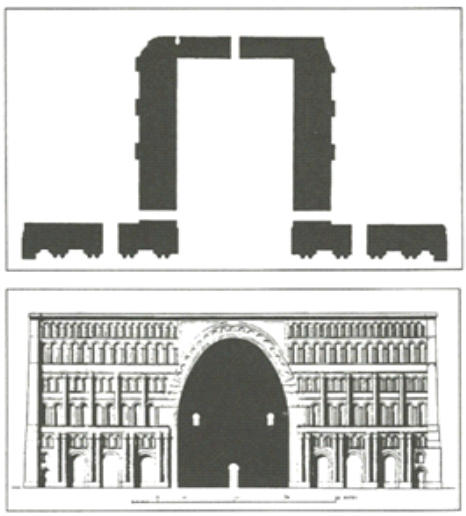

Figure 4. Eyvan-i Medayin (Ctesiphon), Iraq, 241.AC [4]

Eyvan, which is one of the main features of Iranian architecture, is also used in Tabriz houses, but there are no surviving examples of houses with an *eyvan* seen in the photographs obtained from the old houses and there are no examples in the plan schemes from the archives. The last two hundred years of Tabriz houses had semi-open spaces such as *sofa* or *riwaq* covered with flat or domed roofs, with a narrow and elongated square form with rows of columns. Although this space is referred to as *eyvan* in public and in the local language, in this work, such semi-open and transitional spaces are accepted as *riwaq*. *Riwaq* is interior with windows facing either side of the enclosed front garden and located behind the main living space or entrance hall. It is covered from three sides, but its front is open to the garden, which is located in front of the main living space and entrance hall. Thus, although *eyvan* and *riwaq* are seen as two very close-open space examples, their physical characteristics are different as well as their syntactical characteristics. Although *riwaq* serves as a transitional space between *hayat* and the main living space, i.e. *tenebi,* and rooms, it is also used as a climatic balancing item to protect from extreme warmth and cold. It is also the focal point of the building’s appearance and facade arrangement, as well as the space where the ornaments are the most intensely used in the facade arrangement.

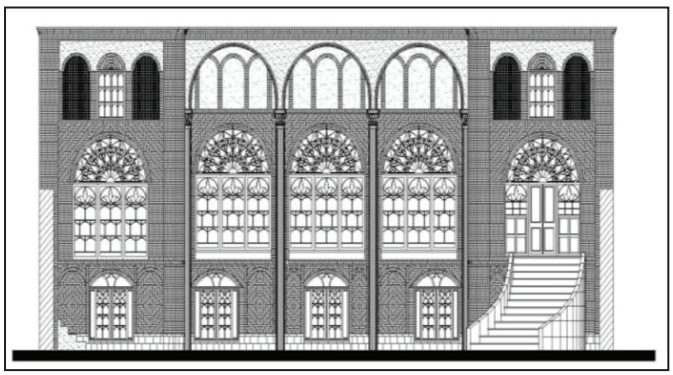

Figure 5. The example of the Riwaq from Tabriz Qenjei House [4]

The enclosed *riwaq* with row columns in front of the buildings in Tabriz is used in two different ways: In the first one, *riwaq* is situated at the same level as *hayat*, and in the second it is higher than *hayat*, acting as a terrace in front of the main living space. In Figure 5, it can be seen that there are semi-open spaces that have the same function in Iran, but are used in different shapes and elevations.

The largest open space of Iranian houses is *hayat*, and the open and semi-open spaces after that range from the level of *hayat* to the level of the roof. The semi-open spaces after *hayat* are, in turn, *eyvan* or *sofa*, then on the upper floor is *sharmi*, and on it, *mehtabi*. *Sofa* is a platform and a living area with higher elevation than *hayat*. In general, in the central and hot regions of Iran, the upper part of the roof and the transitional space formed around it are called *sharmi*. During the transition to *sharmi*, the whole house can be seen from above. In the traditional houses of Iraq, three sides are surrounded by other spaces and the open space to the courtyard is called *tarma*. *Eyvan* and *tarma* have similar functions and features, but unlike *eyvan*, the long axis of *tarma* is parallel to the front. On the other hand, *eyvan*'s front opening comprises arches but the *tarma* has a flat ceiling [20]. Ünlü and Şalgamcioğlu [8] explore the tradition of central space in the Anatolian, Northern Iraq and Syrian houses, and they claim that *eyvan* continues in Northern Iraq and Syria, but this tradition disappear in the transition towards the west of Anatolia [16]. In this context, it is emphasized that geographic and climatic factors play an important role in shaping introverted spaces, as seen in *eyvan*'s placement of the balcony to get the facing elements through an external terrace.

As for *riwaq* (portico); in architectural practice in Iran, Iraq, Turkey and Syria it is called by different terms and features, but all the examples have the same function even if they show differences in shape and position. Figure 6 shows that in Iran, Iraq, Syria and Turkey, *eyvan* is also used in different forms and terms (Figure 7).

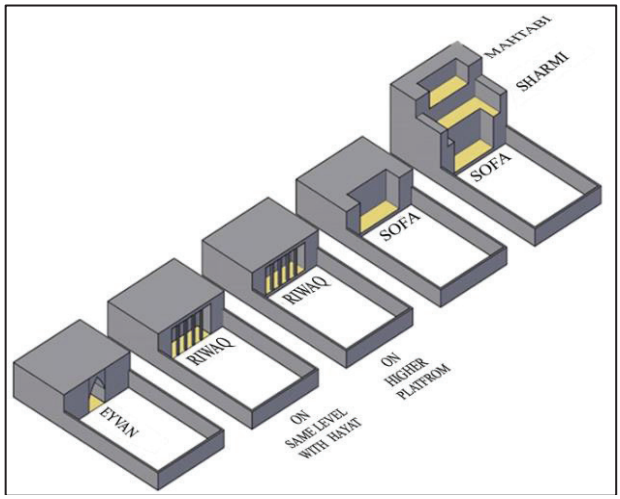

Figure 6. Schematic Demonstration of Eyvan, Riwaq, Sofa, Sharmi and Mahtabi, the Forms of Semi-Private Spaces Used in Traditional Houses of Iran

	WEST IRAN	EAST & CENTRAL IRAN	NORTH IRAN	SOUTH IRAN	IRAQ	TURKEY	SYRIA
EYVAN	✓	✓	✓	✓	✓	✓	✓
SOFA		✓				✓	
RIWAQ	✓	✓					✓
TALAR			✓		✓		
TARMA				✓	✓		
SHARMI				✓			
APADANA		✓					

Figure 7 The distribution of transitional spaces (Eyvan, Sofa and Riwaq) in Iran and in nearby areas [8, 17, 20, 21]

When we classify the plan types of traditional Tabriz houses according to the main item being *hayat*, there can be defined two main types, those with a *hayat* and those without one. The other important item in *hayat* plan types that we have covered in the scope of the research is the transitional spaces, *riwaq*. Three plan types can be established when plans are classified according to *riwaq*. The first type is a *riwaq* type, the second is a non-*riwaq* type, and the last type is a *riwaq* type with a balcony (Figures 8 -12).

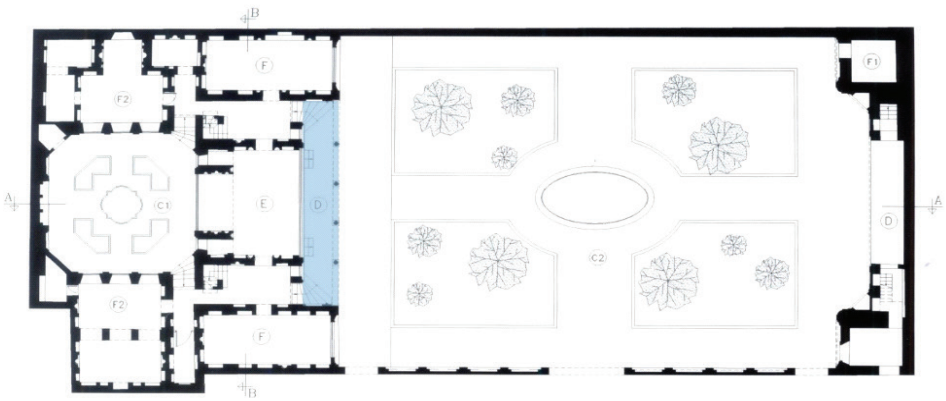

Figure 8. Traditional house plan with riwaq (1st Type), Behnam House [4]

Figure 9. Traditional non-riwaq (2nd Type) house plan, Rastegar House [4]

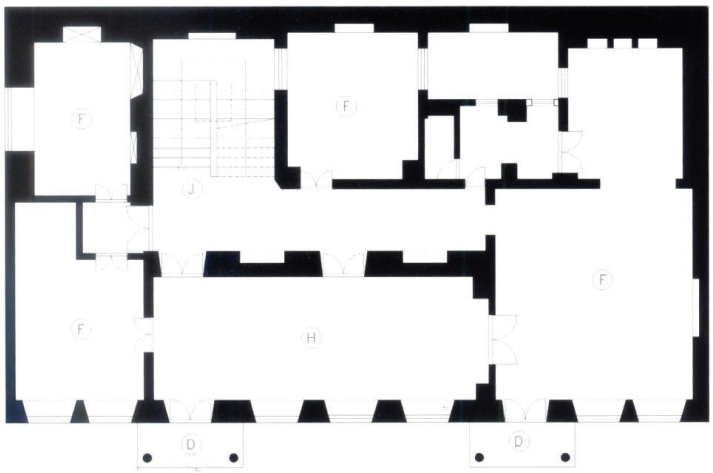

Figure 10. Traditional house plan with Balcony (3rd Type), Lalei House [4]

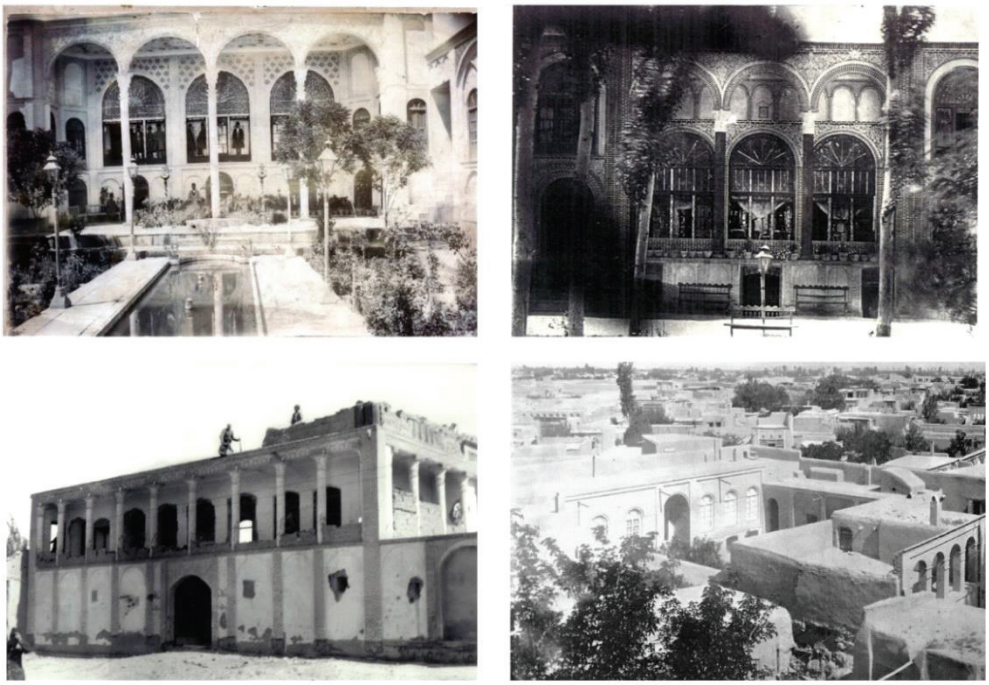

Figure 11. Different forms of use of the riwaq in traditional house of Tabriz [22]

Besides outdoor transitional spaces, there are some indoor transitional spaces *dalan*, *dehliz*, corridor and stairs which have important roles in configuration of spaces. Some buildings have *dalan,* which is a covered corridor connecting entrance to *hayat,* and in other examples hayat can be entered directly, without any buffer zone between in and out. *Dehliz* is the second indoor place to be encountered while entering the building from *hayat* or *riwaq*. *Dehliz* is the space that provides the transition and circulation between the main living space and other spaces.

Figure 12. Tabriz, Example of Hayat in the Sharbat Oglu house

4. METHODOLOGY AND SYNTACTIC ANALYSIS

Firstly, the basic information about the spatial organization of the houses which constitute the main basis of the study is obtained from the plans and drawings. The samples with repeating typology from fifty plan schemes were arranged in chronological order. Ten samples were selected from the houses with single and double courtyards, all with extensive layouts of the plan schemes. Samples are chronologically sorted according to the date of construction in Figures 13 and 14.

Figure 13. Plan charts of the selected samples for analysis of traditional Tabriz houses

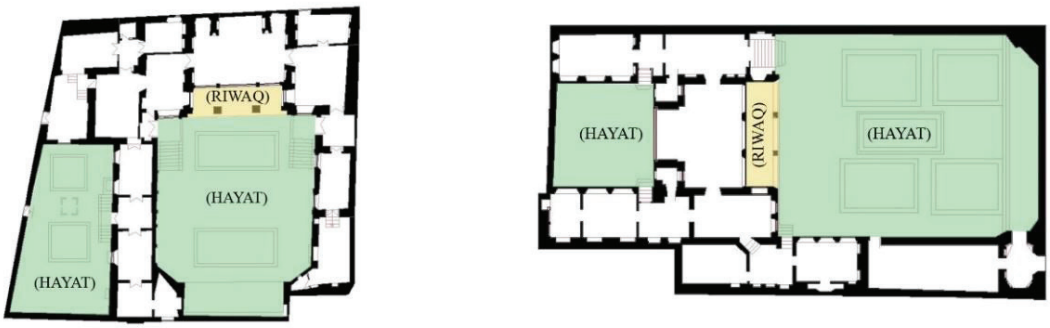

Figure 14. Plan charts of the selected samples for analysis of traditional Tabriz houses

In the first step of examining these examples in the figures 13 and 14, the interior spaces of the houses are divided according to their functional areas. Amorim [5, 23] defines this separation as four regions: social space, private space, service area, and transitional space. Based on this distinction, the daily activities for Tabriz houses and the spaces of Tabriz houses according to open and closed areas can be grouped as follows:

Main Living Spaces:
Main Living space (Guest room)
Living room (Eating and resting, watching TV)
Private zone:
Bedrooms (Sleeping and dressing)
Outdoor Transitional &Social Spaces:
Hayat and Riwaq (Transition, Sleeping and sitting)
Indoor Transitional Spaces:
Dalan, Dehliz, Corridor and Stairs
Kitchen:
Cooking and Socializing area
Service Zone:
Basement floor and service areas around *hayat* (pantry, clothes and tableware washing and drying areas)
Toilet and Bathroom

Figure 15 shows the functional zones in Behnam house plan, as a sample of traditional houses of Tabriz with two *hayat*s and *riwaq*;

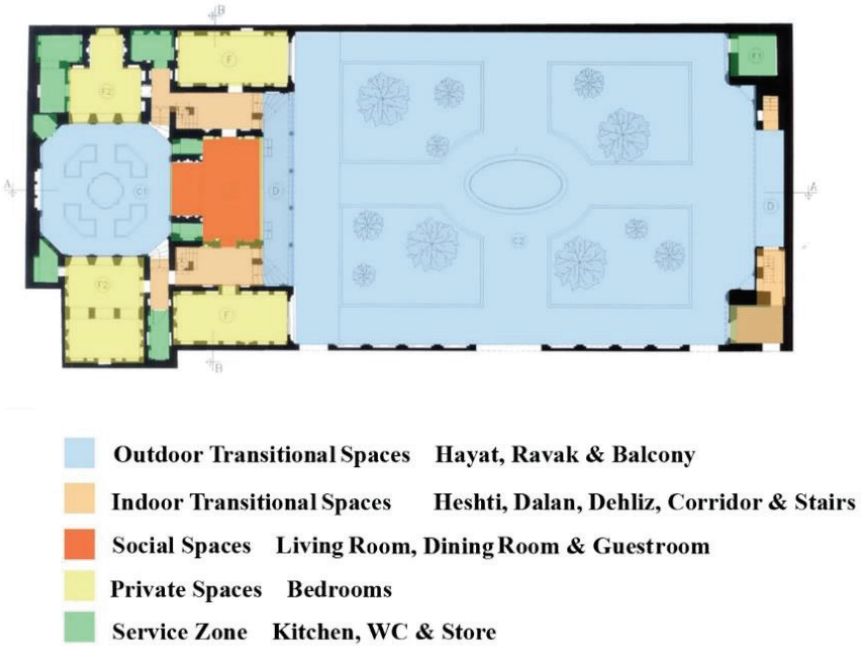

Figure 15. The classification of Tabriz house spaces by function, T03Behnam House

In the next step of the reviews, mean depth values, integration, isovist values and circularity values for spatial analysis of traditional houses were examined. Since each space in the buildings has a different syntactical value, the average of the syntactic value of the spaces with the same function can be compared between the buildings. As a result, according to the syntactic values, information about the social and cultural characteristics of places with the same function can be obtained. The plans and basic information about the spatial organization of the houses which constitute the focus of the work were obtained from the drawings. Later on, the examples of houses with *hayat* continued to provide information about the domestic use of the houses and the habits of the families.

According to Hillier and Hanson (1984), integration is a variable that shows how a space is connected to other spaces in its surroundings. It can be used to measure the presence of people in the space. Therefore, the higher the integration value, the more people use the space. On the other hand, depth value shows the numbers of steps to reach from one space to another. So higher values of depth show that one should cross many spaces to reach that space. The other tool, which shows the user's visibility in spaces is the isovist analysis. According to Benedikt (1979), the isovist value of a space means all the points that can be seen from a point of view in that place. In this context, the value obtained from the isovist analysis describes the area or perimeter of a field of view. Another concept of space syntax is the concept of circularity which reveals information about the geometry of the space. Benedikt (1979) and Batty (2001) define the compactness and circularity values as the ratio of perimeter of space to the area of environmental in the analysis of isovist. These values range from 0 to 1; the closer the value of the circularity is to 0, the more linear the space is; and the closer to 1, the more circular and more central the space is [24]**.** The analysis of circularity in Syntax 2D program also reveals the field of view and the perceivable location of the space in which the analytical space is located, in addition to the geometric information concerning the space [25]. Kaynar (2004) states that the value of circularity in a place is a sign of the narrower and longer field of view in that place [26].

The analysis results of all the samples handled in the traditional houses are seen together in Figure 16 and 17. Figure 16 represents the syntactic analysis and schemes of Qanjei house as a sample of Tabriz traditional houses which has two *hayat*s and *riwaq*. The figure shows all the spaces of the house, its integration, mean depth and circularity values and isovist in plan schemes.

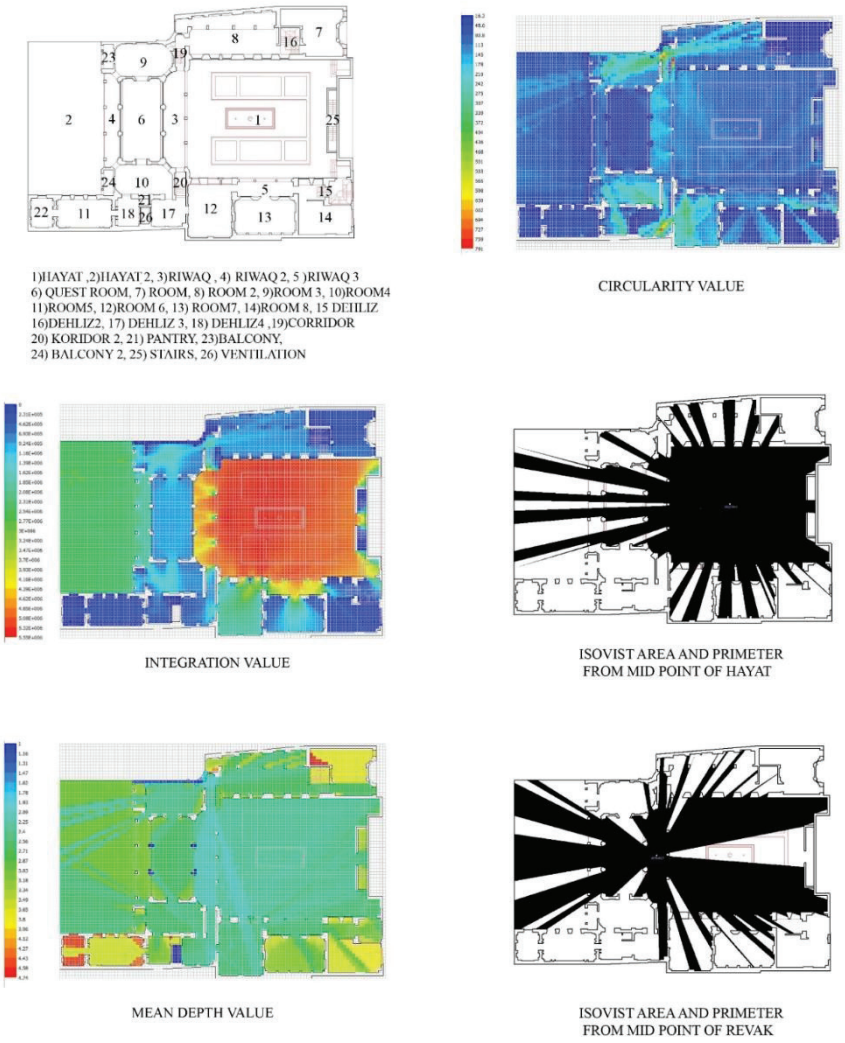

Figure 16. Syntactic analysis and representation schemes of Qanjei House (T01)

In Figure 17, the table is organized according to the functions of each example building, the guest and dining room, *hayat* as open transition space, closed transition spaces, bedrooms, bathrooms and toilets in six sections. Kitchens are both in service and in social zones. However, in traditional houses, kitchens are in basement floors, so they are not taken into account in our analysis. For each of these sections, integration, depth, and circularity analyses were applied, and the results were presented as both individual and mean values. In the last column on the right, the average analysis values of the entire building are given (Figure 17).

		T.01 Genjei	T.02 Alavi	T.03 Behnam	T.04 Haddad	T.05 Haj Sheyhk	T.06 Kazemi	T.07 Nagshine	T.08 Nikdel	T.09 Rahimi	T.10 Bulurchiyan	MEAN
INTEGRATION VALUE	GUESTROOM&DINNIG	0,82	0,49	0,69	0,23	0,32	0,30	0,21	0,65	0,21	0,56	0,45
	HAYAT	3,52	2,13	27,66	7,37	1,53	2,04	1,51	17,40	1,01	5,89	7,01
	RIWAQ	4,05	2,21	21,33	7,17	1,46	1,26	1,45	17,30	0,73	4,13	6,11
	CORRIDORS	1,30	1,31	7,56	4,41	0,62	0,49	0,50	6,97	0,38	1,86	2,54
	BEDROOMS	0,97	0,26	2,42	0,18	0,26	0,23	0,18	2,13	0,20	0,76	0,76
	SERVICE & WC	0,11	0,36	1,71	1,15	0,24	0,26	0,35	1,86	0,09	0,42	0,66
	KITCHEN											
	MEAN	1,79	1,13	10,23	3,42	0,74	0,76	0,70	7,72	0,44	2,27	2,92
DEPTH VALUE	GUESTROOM&DINNIG	0,29	0,25	0,23	0,26	0,24	0,25	0,27	0,25	0,29	0,25	0,26
	HAYAT	0,24	0,19	0,15	0,15	0,18	0,21	0,20	0,16	0,27	0,18	0,19
	RIWAQ	0,23	0,19	0,17	0,16	0,21	0,25	0,20	0,18	0,31	0,22	0,21
	CORRIDORS	0,28	0,21	0,21	0,18	0,22	0,26	0,24	0,22	0,30	0,24	0,24
	BEDROOMS	0,31	0,25	0,26	0,29	0,25	0,29	0,27	0,26	0,33	0,28	0,28
	SERVICE & WC	0,30	0,24	0,28	0,27	0,24	0,28	0,27	0,28	0,36	0,32	0,28
	KITCHEN											
	MEAN	0,28	0,22	0,22	0,22	0,22	0,26	0,24	0,23	0,31	0,25	0,24
CIRCULARITY VALUE	GUESTROOM&DINNIG	0,07	0,05	0,06	0,04	0,08	0,08	0,04	0,05	0,05	0,05	0,06
	HAYAT	0,11	0,04	0,04	0,03	0,05	0,06	0,06	0,05	0,03	0,04	0,05
	RIWAQ	0,15	0,06	0,08	0,05	0,02	0,07	0,09	0,08	0,05	0,05	0,07
	CORRIDORS	0,19	0,07	0,11	0,08	0,09	0,11	0,09	0,13	0,08	0,10	0,11
	BEDROOMS	0,14	0,06	0,15	0,05	0,10	0,08	0,08	0,10	0,09	0,09	0,09
	SERVICE & WC	0,08	0,06	0,06	0,07	0,09	0,08	0,06	0,13	0,06	0,05	0,08
	KITCHEN											
	MEAN	0,12	0,06	0,08	0,05	0,07	0,08	0,07	0,09	0,06	0,06	0,08

Figure 17. Mean Syntactic Values of Traditional Tabriz Houses within separated functional zones from 1800 to 1960

It can be seen in the table above that the most integrated spaces of traditional houses are *hayat*s and *riwaq*s. As these spaces have the minimum amount of depth value among other spaces, bedrooms and service zones are the deepest spaces. Corridors and bedrooms have the highest circularity values, and it shows the contrast between the narrow and long shape of these spaces and *hayat* and guest rooms, which are wide and rectangular in form. The mean values of traditional houses are given in Table 1.

Table 1. Syntactic analyses results and mean values of traditional Tabriz Houses

	Mean Isovist (Perimeter)	Mean Circularity	Mean Depth	Mean Integration
HAYAT	**2.59**	**0.05**	**0.19**	**7.01**
RIWAQ	**2.21**	**0.07**	**0.21**	**6.11**
CORRIDOR	**1.55**	**0.11**	**0.24**	**2.54**
GUEST& DINNING ROOM	**2.84**	**0.06**	**0.26**	**0.45**
BEDROOMS	**1.94**	**0.09**	**0.28**	**0.76**

5. EVALUATION OF FINDINGS

Table 1 shows the average values of *hayats*, *riwaqs*, corridors, guest rooms and bedrooms from all examples. The highest mean isovist of the rooms are the guest room (2.84), followed by *hayat* (2.59) and *riwaq* (2.21). The lowest isovist value is that of the bedroom. Therefore, it can be assumed that users have the highest visibility in guest room and *hayat,* which are mostly used by guests. These spaces have large areas, and more openings to other spaces than others. In Table 1, when the distribution of the circularity values is taken into account, the highest mean value for the corridor is 0.11, bedrooms come as second, and *riwaq*, guestroom and *hayat* have the lowest values. This shows that closed transitional spaces have the highest value of circularity among all living spaces of houses.

The mean depth and integration values are also presented in Table 1. *Hayat* is the shallowest space with the lowest mean depth value. The value of depth increases in the passage from *hayat* to interior spaces. Thus, the deepest spaces are the bedrooms. This finding also confirms the common understanding that *hayat* is a semi-public space in the traditional Tabriz houses. At the same time, the transition from outside the house to the inside of the house confirms the passage from public to semi-public and from there to semi private and private areas. On the other hand, the integration values are expected to be in contrast with the depth values. As seen in Table 1, the spaces with the highest depth values have the lowest integration values. As a result, *hayat* and *riwaq* are the shallowest spaces, and they have the highest integration values. However, as shown in this table, the value of *hayat* is higher than that of *riwaq,* and it has the highest mean integration value (634). To explain this, it is necessary to pay attention to the geometry of *hayat*, and the examples with multiple *hayats*. This is because in some cases, such as the Alavi house, the entrance to *hayat* is provided by a long corridor, and this long corridor leads to a decline in the value of integration of *hayat*. On the other hand, houses with two courtyards such as Genjei, Behnam and Kazemi have a deeper second yard which serve as inner gardens. Thus, the bigger the yard in the entrance of the building the shallower it is, and this makes it the most integrated space. Therefore, in the analysis, instead of the average value of both *hayat*s, the value of the first *hayat* is taken into account, and the integration value of the second courtyard is not added to calculations to normalize the comparisons between all plan types. It is considered that the mean depth value should be the highest in the bedrooms, and the mean integration value should be the lowest. However, the mean value of the guest

rooms is 7.60 and the bedrooms have the lowest value (4.27). This is because the number of bedrooms is higher than the single guestroom, so the number of cells that can be analyzed in bedrooms is higher than the number of cells in the single guest room. On the other hand, each bedroom is connected with more rooms than the guest room is, since they are located near the utility room, service areas and the corridor. As a result, it can be explained that the bedrooms have a higher mean integration value than the guest room. This reveals the spatial arrangement and syntactical characteristics of the traditional Tabriz houses and the connections between the spaces where life passes.

6. CONCLUSION

The syntactic analysis of the traditional houses in the city of Tabriz from the early 19th century until the 1960s shows that the analyzed houses have a general concept of introverted and central spaces. In particular, it is understood that *hayat* and *riwaq* are the two essential elements that control and dominate the spatial relations in the house. They have an important role in the arrangement of the living spaces. This fact is supported by the syntactic analysis. One of the results of this paper shows that *hayat* and *riwaq* are the most integrated and central places in all Tabriz traditional houses. These areas are close to outside, and thus they are shallower spaces compared to the bedrooms and other private living areas. On the other hand, as a result of the analyses, *riwaq* is deeper than *hayat* and, the former's average integration value is lower than that of the latter. This shows that *hayat* and then the *riwaq* have social characteristics as well as functioning as transitional spaces. These spaces are the buffer spaces between social and private spaces. Finally, when the traditional houses of Tabriz are considered as spatial organization, *riwaq*, always located in the middle of *hayat*, is used in rectangular form along the facade in front of the main living and guest room of the house, and *hayat*, located in the heart of all spaces, has the vital role in the arrangement of living spaces of Tabriz traditional houses.

Beside transitional spaces that have main role in arrangement of home spaces, the analysis shows that social spaces and private spaces are located around *hayat*, and connected to each other by corridor and *dehliz*. Therefore, in order to reach social spaces and private rooms, users have to cross spaces step by step from outside to inside of house, and this hierarchy makes bedrooms more private than other spaces. As a result, it can be assumed that Tabriz traditional life style needs more privacy, and the arrangement of living spaces correspond these needs. For hosting guests in the best part of the houses, the guest room has the highest visibility to *hayat* and semi-open areas, which give a pleasure to the guest during their stay in traditional houses of Tabriz.

As this research is a part of an ongoing PhD thesis, further papers from the same research will focus on private spaces and main living spaces of traditional houses, and their evolution over the last two hundred years. In this paper, we see the importance of open and semi-open spaces in Tabriz traditional houses, which have the highest value of integration and circulation between all spaces. Syntactical analysis shows us that *hayat* can be considered as the core part of traditional houses of Tabriz.

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