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## THE IMPACT OF CULTURE ON HOME SPATIAL STRUCTURE PATTERN USING SPACE SYNTAX APPROACH (CASE STUDY: TWO-BEDROOM HOMES OF 70'S, 80'S AND 90'S DECADES IN TEHRAN)

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**Resumen:** La influencia de la cultura en la arquitectura ha sido investigada a través de varias metodologías hasta el momento. En la presente investigación, la metodología de sintaxis espacial, un enfoque cuantitativo, se selecciona sobre la base de razonamiento lógico y modelado. La metodología se basa en la recopilación de estudios de casos de apartamentos de dos dormitorios que son en su mayoría propiedad de la sociedad de clase media de Teherán y se encuentran en abundancia en la ciudad. El hallazgo de esta investigación es cuatro índices propuestos incluyendo la interacción, la hospitalidad, la entrada sin pasar por alto y la jerarquía. El resultado demuestra que la interacción y la privacidad en el espacio de entrada ha aumentado a lo largo del tiempo, mientras que la jerarquía y la segregación de los espacios públicos y privados han sufrido un declive. Empleando los casos que poseen los cuatro índices, uno es capaz de encontrar soluciones para impulsar estos valores en la arquitectura contemporánea. Dichas soluciones se componen de: la creación de nodos en el espacio de entrada, el aumento de terrazas, la creación de espacios de interfaz y nodos entre espacios privados y públicos, separando el espacio público y privado.

**Palabras clave:** sintaxis espacial, estructura espacial, hogar, casas de dos dormitorios, iraní islámico.

**Abstract:** The influence of culture on architecture has been investigated through various methodologies so far. In the present research, space syntax methodology, a quantitative approach, is selected based on logical reasoning and modeling. The methodology relies on collecting case studies of two-bedroom apartments which are mostly owned by the middle class society of Tehran and are found in abundance in the city. The finding of this research is four proposed indexes including interaction, hospitability, non-overlook entrance and hierarchy. The result demonstrates that interaction and privacy in the entrance space has risen during the course of time while hierarchy and segregation of public and private spaces have undergone a decline. Employing the cases which possess all four indexes, one is able to come up with solutions to boost these values in the contemporary architecture. Such solutions are made up of: creating nodes in the entrance space, increasing terraces, creating interface spaces and nodes between private and public spaces, separating public and private space.

**Keywords:** space syntax, spatial structure, home, two-bedroom homes, Islamic Iranian.

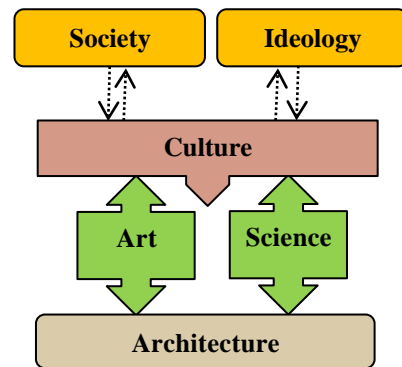
## 1. INTRODUCTION

The relation between culture and housing has been explored in a variety of studies. However, none of them has delivered a result according to which local principles could be formulated. On the other hand, the role of culture in the formation of houses has diminished under the strong shadow of economic factors and construction regulations. The present research is an attempt to obtain a proposed model for building a desired home according to the Iranian and Islamic criteria by describing the impact of culture on the homes and extracting their cultural criteria. To achieve this goal, the culture and home are required to be understood. Then, lifestyle and culture of residence, as the strings binding home and culture to one another must be studied and finally the cultural criteria of home need to be derived and presented.

## 2. LITERATURE; CULTURE, HOME AND BINDING STRINGS

Culture generally means the inference of a nation about the way of living and thinking (Nodooshan. 1975) which includes a set of nation- and tribe- related values, norms, customs, religion, traditions, languages, literature, social obligations, art and architecture, tools and devices within the consecutive centuries. Culture is mainly responsible for demonstrating ideologies, goals and specific aspirations of a society through concrete objects. As such, it affects and shapes architecture and urban structure which is an indication of the value system governing the society. Each construction is to concretize a mental notion and each building is both a symbol to assess culture and a cultural witness (kurt. 2002). The culture of a society is composed of intangible aspects – beliefs, notions and values forming the content of culture – and the tangible aspects – tools, symbols or technology which represents the mentioned content (Anthony. 2008). Therefore, the principal components of culture are religion and society in which culture is shaped and evolved. In short, the most significant factor in the relationship between the members of a society is "value" which originates from culture and influences social interactions. The ideal culture emerges from values whose illustrations are subliminal ideas in art and architecture (Ghezi, Reza. 2014). In fact, the social and cultural human has created, resided and made changes on a distinctive form of housing with its specific spaces, certain types of pathways, neighborhoods, and etc. (Khanghah, Asghar. 2001). In Figure 1, the aforementioned relation which is the framework of the present research is illustrated.

Figure 1. Structure of the constituent factors of culture and its relation with architecture (author)



## 3. CULTURAL FEATURES OF HOME BASED ON THE IRANIAN ISLAMIC MODEL (THE IDEAL MODEL)

Considering the conducted studies and the future perspective in the country, the Iranian Islamic culture which forms the Iranian Islamic lifestyle and creates Iranian Islamic home model outlines the proposed indexes for the ideal home. In table 1, these indexes and the way by which they are extracted are mentioned. These features include:

The existence of open or semi-open space: according to the available cases, the private open space is omitted from the home architecture and the private semi-open space is replaced in some homes under the title of "terrace".

Hierarchy: hierarchy means the existence of interface nodes between two important spaces or different enclosures which provide different access.

Enclosure: it signifies the perception of home space for different individuals. Mostly by enclosure we mean the entrance space into the home for the remaining spaces.

Private and public area: This feature is the segregation of used areas in proportion to the extent of individual domesticity at home. Regarding the Iranian Islamic architectural indexes, it shows the extent of hospitality while preserving Islamic obligations at home.

## 4. RESEARCH METHOD

The methodology applied in this research is a kind of logical reasoning which analyzes and finds the models

governing architecture through employing mathematical approaches. This approach, known as space syntax, turns the architectural plan into an abstract map as the Gama map by defining the schematic systems of math (Groat and Wang, 2011). In the above-mentioned method, as illustrated in Figure 2, having collected the cases from the target homes, space syntax graphs are prepared and the features of various homes are determined and investigated by arithmetic and geometric methods.

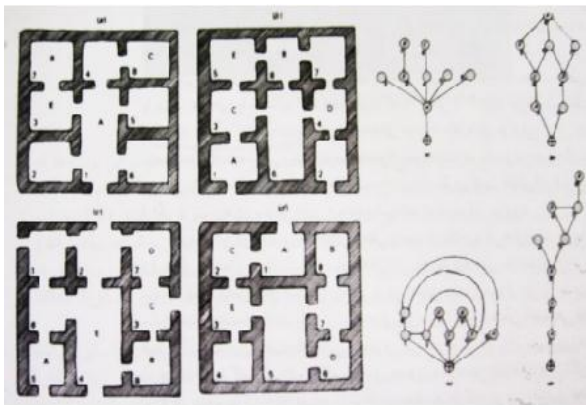


Figure 2. Adopted from "The Social Logic of Space", written by Bill Hillier and Julienne Hanson, ground plans (left side) are summarized into the shape of Gama maps (right side) (Groat and Wang, 2011)

To study the features of Iranian Islamic homes in the present time, a research was carried out in which 313 homes, mostly from the apartments in Tehran, were surveyed. These homes, ranging from 70 to 125 meters, are selected from different regions of Tehran and belong to the middle class society. In Table 2, all of the homes under study in the research are presented. To examine the effect of Iranian Islamic characteristics on the current homes, 150 cases of homes are chosen from the last three decades. The frequency of each mentioned index in the studied cases are demonstrated in Table 3. In some of the homes, all four indexes are simultaneously available which can be regarded as the ideal pattern. Table 4 distinctively illustrates the number of homes separated by decades.

Table 1. cultural features of homes (author)

Method of display in the graph	Cultural feature of home	Cultural feature of existing culture of residence	Feature of Iranian Islamic Culture	Cultural feature of Iranian Islamic lifestyle
Existence of terrace	Existence of semi-	Existence of terrace	Interaction	Interaction with the

node in graph	open space			outside world while preserving the Islamic obligations
Possibility of separating the graph into two halves of right and left (existence of straight axis between the area of two graphs)	Existence of public and private area	Existence of border between the combination of living room, kitchen, bedroom and bathroom	Hospitality	Hospitality and preserving the Islamic obligations
Length of graph for reaching the bedroom node, over 3 nodes considering the entrance node	Existence of hierarchy	Bedroom space reaches the living room with several interface spaces	Accessibility suiting enclosure	Accessibility and location of spaces suitable for their extent of enclosure
Existence of node in the entrance space	Existence of enclosure	Entrance space is attached to the living room with a node	Non-overlook entrance	Entrance to home without overlooking the whole spaces

Table 2. The features of Iranian Islamic homes in three decades (author)

Home Case category	Number
50's	29
60's	25
70's	19
80's	101
90's	67
<b>Total home cases</b>	<b>313</b>

Table 3 . Frequency of Iranian Islamic homes in two-bedroom homes of three decades (author)

Title of Index	Frequency in 70's	Frequency in 80's	Frequency in 90's
Interaction with the outside space	27	28	42
Hospitability	45	37	45
Hierarchy at home space	46	44	46
Enclosure at home	24	34	33
<b>Total number of two-bedroom homes</b>	<b>50</b>	<b>50</b>	<b>50</b>

Table 4 . Frequency of Indexes (author)

Title of Index	Frequency in the total homes	The percentage of frequency in the total homes
Homes without index	3	2
Homes with one index	5	3.33
Homes with two indexes	29	19.33
Homes with three indexes	54	36
Homes with four indexes (ideal model)	59	39.32
<b>Total number of homes</b>	<b>150</b>	<b>-</b>

## 5. DATA ANALYSIS

Taking a glance at the indexes displayed in the above table, one can see that each of the features of Iranian Islamic homes is measured with a Figure 3 within three decades and their result is presented.

### 5.1. Interaction with the outside space index:

It is advised to benefit from the natural light and establish an appropriate connection between the home and outside space according to the Islamic doctrines and within a proper framework (Amin Poor et al, 2015). This index, titled as interaction between home and the outside space, remains only in the terrace in the spatial structure of contemporary homes and it is illustrated as a node carrying the same name in the space syntax graph. The findings of a study performed on the same index in the current home indicates that by the pass of time and due to various reasons, within 30 years, the availability of

terrace in the two-bedroom homes of Tehran has risen signifying the growth in the interaction between home dwellers with the outside space during their presence at home. Having interviewed the home residents, the author was told that one of the major reasons for preferring the terrace-bearing homes is the need to make up for the reduction of communication with the outside world especially in the higher floors. Taking into account the fact that having a terrace is not an obligation in home regulations, the trend among residents to purchase terrace-bearing homes has turned such kind of homes into an advantage and consequently increased this feature at homes.

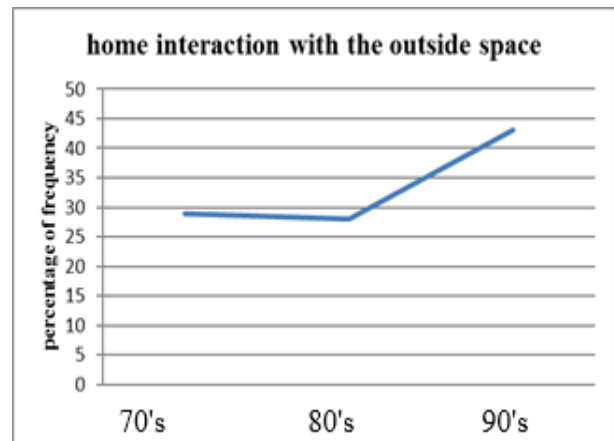


Figure 3. The changes of "home interaction with the outside space" index within 30 years (author)

### 5.2. Hospitability

According to the Islamic doctrines, personal privacy at home does not mean a defensive border against society, but Islamic doctrines oblige the human being to welcome guests and share their personal privacy at home with them. The outstanding Figure 4 of religion welcomed the guests and a specific space was devoted to the guests at their homes (Pakdel et al, 2016). This index does not possess a single definition and it can be expressed in a variety of ways. In the spatial structure of home, this concept is demonstrated by segregating the public and private area and establishing an interface axis between the two areas in the graph. Considering the gradual trend within the 20 years, it is shown that for a period of time, in the two-bedroom homes with the area ranging from 80 to 125m, the architecture has distanced from the hospitability pattern, public area separation and Iranian Islamic pattern. However, afterwards, the trend has reverted to the previous status. The major underlying reasons involve the high price of land, tiny spaces, and etc. There might be other reasons which need to be investigated.

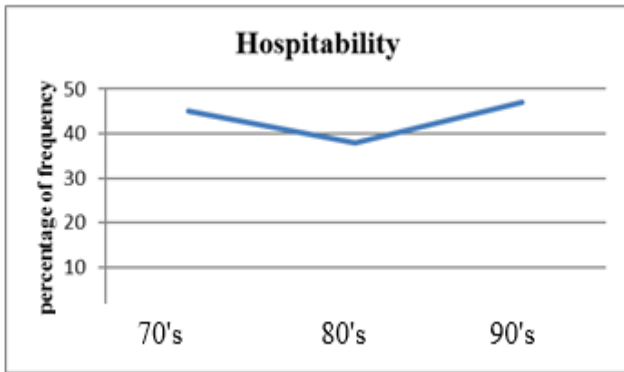


Figure 4. Changes in "hospitability" index within 30 years (author)

### 5.3. Hierarchy at home space

Islam has advised to respect hierarchy either at home or city and pay special attention to the grades of value at home (Amin Poor et al, 2015). This concept is able to be realized at home in the format of creating nodes or interface spaces between sleeping and entrance space. The results indicate that hierarchy dropped for one period within 30 years. One can choose such kind of homes through consultation with design companies or real estate agencies. Findings show that people prefer the homes where they can preserve their privacy even though the residents outnumber the bed rooms (Figure 5).

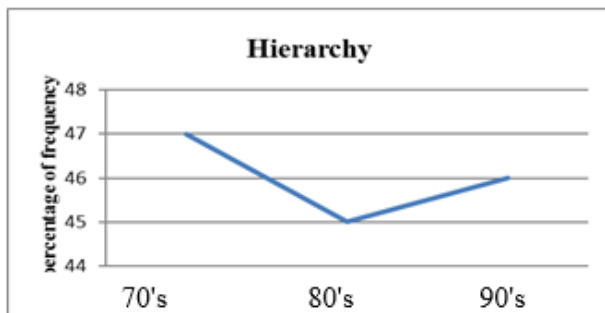


Figure 5. changes in "hierarchy at home" index within thirty years (author)

### 5.4. Privacy at home

Respecting the privacy of neighbors, not having an overlook to their space and having privacy at home is highly advised by Islam for providing a desired residing space (Pakdel et al, 2016). This aspect is revealed at spatial structure of home in different ways. The present study focuses on the entrance privacy relative to the other spaces. The privacy is ensured by forming nodes, restricting the view and obliterating overlook. The result of studying privacy at homes within the last three decades demonstrates that the entrance of recent homes tends toward being node-equipped after a period of decline in the quality of entrance designing. The change

in the trend signifies the promotion of pattern and a movement toward Iranian Islamic model which must be strengthened by supportive principles.

## 6. STUDYING THE HOMES POSSESSING ALL FOUR INDEXES

As already stated, four indexes including interaction, hospitability, non-overlook entrance and hierarchy are the outcomes of this research recognized as the index of architecture in the current homes. Among the 150 homes under study, 59 of them have the ideal model features of current homes whose utilized practices are presented as proposal to be applied in other homes:

### 6.1. Creating nodes in the entrance space using the walls or retreating

The entrance space as the transition between the interior and exterior space must have a set of mysterious features by that the home is both concealed from public view and displayed for public reach (Alexander, 2011). Therefore, the retreating entrance space can play transitional role very efficiently by providing an interface space between the public and private area (Figure 6).

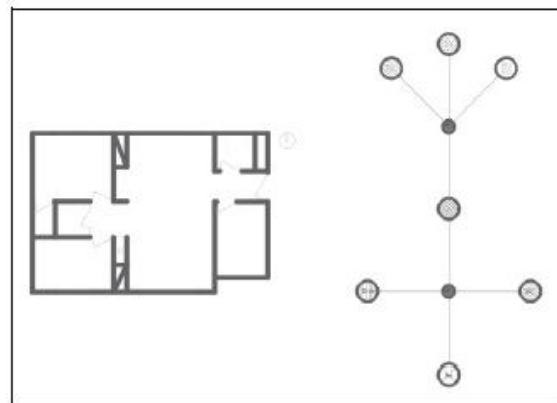


Figure 6. Plan and graph with node in entrance (Author's archive)

### 6.2. Increasing the number of terraces:

The availability of terrace as a half-public space can contribute to efficiently benefiting from natural light and enhancing interaction with the outside space. In case this space is designed adjacent to the bedroom or kitchen, it can be useful in building more private interaction with the outside space and facilitating the hospitability at home (Figure 7).

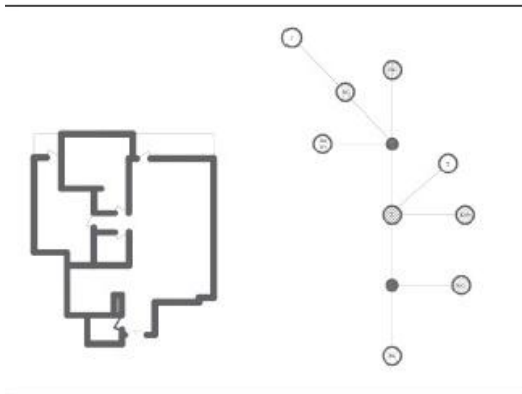


Figure 7. Plan and graph with two terraces (author's archive)

### 6.3. Creating nodes before entering bedroom

The bedroom space and its interaction with the public areas have a considerable impact on the quality of home architecture. Creating interface spaces from entrance to bedroom means increasing the length of graph and the number of its nodes (Figure 8).

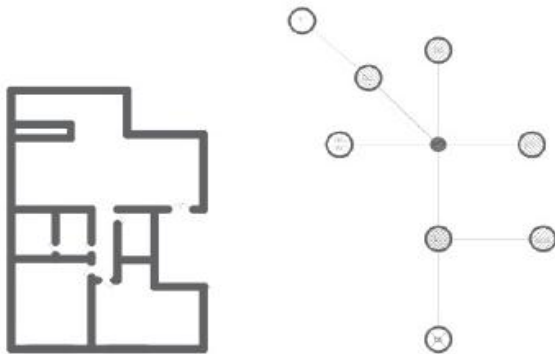


Figure 8. Plan and graph with node before entering bedroom (author's archive)

### 6.4. Segregation of public and private area:

Segregation of public and private area at home is identifiable by creating two main sections in the preliminary plan. If these two areas are distinctively defined before developing each space, the hospitability increases and the privacy of private areas is better protected (Figure 9).

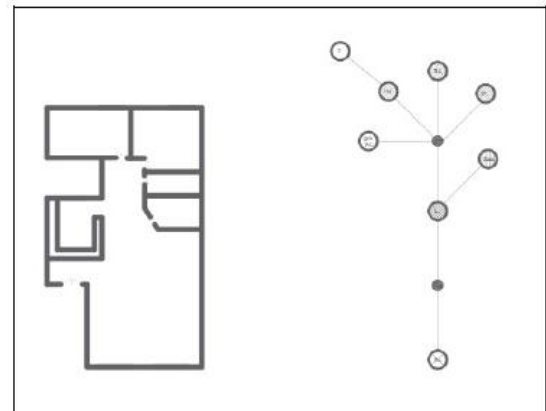


Figure 9. Plan and graph with two segregated public and private areas (author's archive)

## 7. CONCLUSION

Having studied a set of current home, one can say four indexes obtained from Iranian Islamic culture including interaction, privacy, hierarchy and hospitability have been displayed in the present homes. In some cases, all of the indexes simultaneously exist. By the pass of time, two indexes have fallen while the other two have grown. Although these houses are known as ideal pattern among the current homes, there are some models of Iranian Islamic culture which have not found the potential to be transformed into homes. These models existed in the past homes, but they have been removed from the spatial structure of current homes during time. To take as an instance, in "interaction" index, a spring house is one such space which needs to be explored.

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