

Study the Symmetry and Balance in Iranian Traditional Homes' Architecture (With a Focus on the Cities of Yazd, Isfahan and Kashan)

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Abstract: Architectural past periods of Iran were always inspired by the use of geometry and rich and detailed drawing practices. So far, knowledge of the mathematics rules and drawing and the use of specific types was the duty of every architecture and beyond it, the engineering knowledge and knowledge of geometric means and the distinction between architects and their competition with each other has been based on the same axis. That is why you can see, a variety of geometric relations, details and decorations have been respected. One of these relations is symmetry, according to Antonio Palladio, the need for symmetry to coordinate has no place for the question and is considered as one of the aesthetic principles, although it is essential to say that symmetry argument cannot be proposed apart from the balance. The purpose of this study is to examine the concepts of balance and symmetry, in traditional Iranian architecture with the residential architecture approach of Iran. In this study, after defining the order, aesthetic, balance and symmetry, we will study the symmetry in the world and Iran architecture and then we will provide reasons for symmetry use in Iranian architecture will explain the use of balance and symmetry in Iran traditional home architecture.

Key words: Symmetry, balance, architecture, Iran traditional homes, geometric

INTRODUCTION

One of the main problems of today all common architectural styles lies in the lack of exact knowledge of the order and disorder concepts. After the modern era, today we are witnessing that the unleashed chaos in the new architectural style have the contrast to the culture and traditions of countries as well as it dropped to personal taste and is better to correct this problem, studies will be done with discipline and its components in the past architecture.

The fundamental point in history, it can be pointed out is that in the face of past architecture, the wide variety of content emanates from the culture, economy and traditions of each society and appears in the various functions in architecture can manifest in fixed form. In other words, architectural forms that have the ability of pattern and Topologies may outbreak at different times and fields, in a similar manner. Of these, geometry and order in architecture can be mentioned that regardless of its functional content imposed on it, manifests in such a fixed way in a variety of architecture methods in different places and different times, levels of symmetry and the balance resulted of the geometry can be seen in a variety of traditional Iranian architecture.

SssA geometry system of traditional Iranian architecture such as the creation system is based on the

regularity, moderation and traditional architects and artists, all their efforts were to make and use everything in its place and the best of all. The purpose of this research is to investigate and study the components of balance and symmetry as components of geometry and order in traditional Iranian homes and determine in what form the symmetry in Iranian traditional home architecture is used.

Research questions:

- Have the symmetry and balance as characteristics of the order and geometry of the building been used in Iranian traditional architecture?
- What are the reasons that the Iranian architecture uses the symmetry?
- How the balance and symmetry are used in the Iranian traditional home?
- What level of symmetry is used in the house of traditional Iranian architecture? Why?

MATERIALS AND METHODS

Definitions

Order: In the period before the Greek philosophy, the order was as the main features of the universe, the completely common attitude. "Plato knows the most beautiful aspect of fitness and order when something joins itself and something else together so that a unit and

full thing turns out. He, also, in many treatises, spoke of harmony and knew the harmony gestures which knew with circular movements of a kindred spirit, a blessing given by God that comes into play for regulating the shaken and wandering spirit” (Taghvayi, 2013).

Oxford dictionary defines the order (a formal combination or any regular, systematic or coordinated archive in the type of the creatures located in a place or space or the type of the constituent entities of a group or collective) as well as (a condition where everything is in its proper place and does their proper duty). In addition, the order indicates (a class, group or any kind of persons, animals or objects on the basis of the same parameters, completeness or importance placed in their proper order or according to his nature is distinct from the others).

“The order, in Persian dictionaries, means (gathering and providing and collecting) (Dehkhoda dictionaries) in Arabic dictionaries, order means (gathering, order the pearls, meaning add it in a string or close anything to another or attach a part of it to another in fact you have given order to it)”. What is understood from this definition is that in order to provide order, having a program and a quality to close and proximity of components and sizes are necessary so in each order, the program, intelligence, creative intelligence and eternal life are essential, to bring the plurality of sizes into unity and order.

Symmetry and balance as a principle of order and aesthetic: “Symmetry or harmony is as a way of regulating, meaning the similarity of sectors, revolves around or center of symmetry. In a combination of city views, the body of a street or square, may a facing has no symmetry or balance but in total, symmetry or balance will be achieved with the adjacent views.”

It should also be noted that the term of symmetry does not reach its full meaning, regardless of other abstractions such as balance and also without any proportion in architecture and cannot find a real review; if the balance is combined with the rhythm and frequency and the proportion is also a function of scale.

“The term (symmetry) is a certain balance that is from the lineup of reflected elements on the one hand and axis on the other hand-like a mirror-symmetry is indeed a special case through the elements’ orientation. Gestalt psychology has shown that the symmetry factor is more powerful than the similarity.

In fact, the balance in any language refers to the sense of harmony to coordinate and balance and

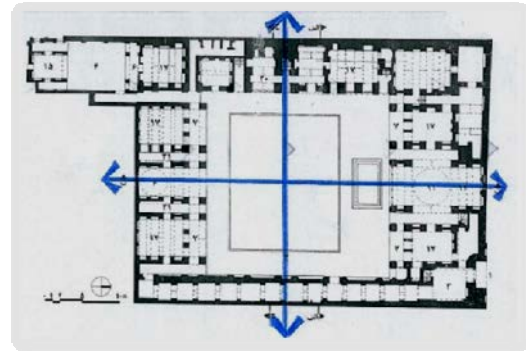


Fig. 1: Symmetry in Iranian traditional house plans

beauty. This symmetry may be observed due to the passage of time as a spatial relation, through geometric transformations such as changes in scale, reflection and rotation or through other types of functional developments and as an aspect of abstract objects, theoretical models, language, music and even the knowledge (Fig. 1).

Symmetry in art and Iranian architecture: Post modernized human’s look to nature was a clip with the order of symmetry and compliance mentality with the environment, has an impact in terms of aesthetics that symmetry becomes the clarity and readability of aesthetic criteria. In Iranian traditional architecture, the aesthetics were organized based on the same principle in the body of the past buildings; symmetry is spotted clarity and transparency that the use of Euclidean geometry helped to advance it. Phone Mais in his book “looking at the fundamentals of architecture” divided the symmetry in architecture into two parts.

“symmetry as the aesthetic principle: in the axial symmetry, occupying the center with a rigid and full element abstains ... from the Egyptians to the Renaissance and the eighteenth century, a central or bilateral symmetry are mainly used for religious buildings and the ones that followed up the temporal power.”

“Symmetry as a principle in construction: is a symmetry that is created by making frames, arches, domes, simple openings and. This symmetry often raises a kind of strange embarrassment what is annoying here is not the symmetry but it is the central approach to it which in most cases it has the logical consequence.

Navayi and Haj Ghasemi know the symmetry as the most important concept that makes the space human, sublime, quiet and motionless. According to them, Islamic architecture in the most possible way has used the

symmetry for the emergence of unity in diversity and diversity in unity and the symmetry has its own varieties in the plan, facade and volume.

Professor Karim Pirnia says about symmetry in residential buildings and public buildings that of the major features of authentic mosques and public places are that in mosques, the building must be “paired” that is a perfect symmetry is preserved so that, to draw a look at the collection center which is the most important part of the building. Despite residential house that was trying to use “Paired Pod”, meaning diverse and meet daily needs, even in a building like the palace of the Persian Sarvestan a dome was built in the middle that in one of its sides a square shape room and on the other side a long room are located that is a restaurant. On the one side, a porch is built and another side has springhouse but in general the center of the building is more important or a lofty dome is covered (Karim and Hossein, 2014).

Reasons to use symmetry in Iranian architecture:

Symmetry is not just Iran Art, but it has many applications long time ago in Iranian art, as Papadolo said, Iranian architecture benefits from the mirror aesthetic, the Achaemenid column heading, Sassanid symmetric fabrics have used this element well, in general, symmetry is the tradition of Aryan tribes which later was transferred to other civilizations. Symmetry is one of the commonalities between the arts and between art and architecture which because this debate depends on time, location, cultural and religious elements factors, we cannot determine precisely why the Iranians have used symmetry in art and architecture but according to various sources, the following reasons as stated reasons of symmetry in art and architecture can be said:

- Symmetry, as a regulatory factor and visual perception
- Use of square or rectangle in Iranian architecture
- Symmetry in order to achieve perfection
- Symmetry as energy reduction

Symmetry as a regulatory factor and visual perception:

“Symmetry in Islamic architecture, almost as an inclusive general rule, affects integrating areas, volumes, shapes, surfaces and other components in general and component and regulates the various parts of the building and numerous elements of the building regulate under a single law and turn into a whole unit. For example, we can mention yards, domes and symmetrical porches on both sides of the building, symmetrical facades on both

sides of the courtyard, arches and symmetrical vault views in a facade and the like that are some of the symmetry wide application in various degrees (Kambiz and Ghasemi-Kambiz, 2012).

Symmetry facilitates the general understanding of a building, it begins from a large-scale, permeates with repeating in itself into small pieces, samples of which can be seen on the facades of houses. In general, a main symmetry axis has been always visible. Components on both sides of this axis preserve the symmetry as a principle while they begin to crumble. As far as every member has symmetry in itself.

Use of square or rectangle in Iranian architecture:

The number four can be the most important number that almost has been considered in all cultures of the world. This number importance is due to the human physiological structure, because the structure of the human body is in such a way that divides the arenas around in four directions (forward, backward, right, left). This four sides division is compatible with the structure of the cosmos and ground mountain position, more or less. Number four and square shape in terms of mathematical and geometric structure is in such a way that, in terms of architecture, it can be considered the most static volume as a result, it was considered in almost all the lands of ancient architecture. Iran ideal city shape that its construction was given by Ahura Mazda to Jamshid Shah was square (Fig. 2).

The first division of symbolic and geometric square can be knows its division into four equal parts, with the help of two intersecting fair lines and given that the ability is for each square shape, it can be stated that, a square can be divided in this way to infinitely smaller square. This division was used in some square-shaped four gardens in the past. Soltan zadeh using squares and rectangles in Iranian architecture and discipline them, by symmetry and balance is one of the most important reasons of symmetry use in Iranian architecture.

In some cases that the central space combined with four spaces located on four sides, a so-called four plate space was appeared, many four plates were considered in some grave palace, baths and houses in particular, a number of Zavareh houses.

Symmetry in order to achieve perfection: It is important to note that, symmetry in traditional arts is not just a way of expanding the role and the proliferation of projects. Symmetry has complementary and perfectionism aspect, imagine, Shamse in the middle of a dome or middle

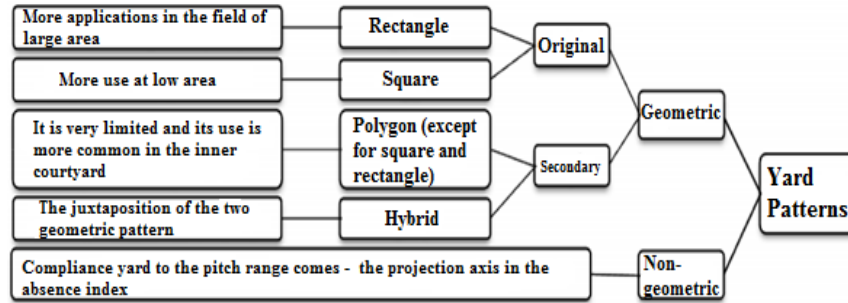


Fig. 2: Various forms of the yard in Iran traditional home (Nejad-Mahdi, 2015)



Fig. 3: Symmetry in brickwork of herat mosque and tiling mosque of Yazd (Nejad-Mahdi, 2015)

bergamot of a carpet will be uncompleted, do we feel deficient, certainly our eyes and senses want to complete Shamse and bergamot in fact, by using symmetry, our design will be completed, it reaches maturity (Fig. 3).

“One of the most persistent symmetry is mirror symmetry. It is a kind of symmetry, that the two sides of the plan are absolutely with no wane the same. This analogy is a metaphor for the internal and external, that must be the same and basically, the mirror philosophy is the same, it shows diagnostics and roles have similarities with humans (Nejad-Mahdi, 2015).

Symmetry as energy reduction: Although, it is not clear, that the Iranians have access to the level of science and used the symmetry in order to reduce energy use, however, this factor can be named as one of benefits of symmetry in the Iranian traditional home.

Houses in Iran have the symmetry in two axis and central forms in the central courtyard views and other elements. Soheili Fard *et al.* (2014) in a study entitled “Analysis of the Traditional Iranian Architecture and the Sun Interaction” modeled Abbasids home building views, symmetrical principle and the impact on the openings have stressed on the Iranian approach to energy efficient house and guaranteed the thermal comfort of residents. According to this study “with an emphasis on symmetry, despite receiving variable direct radiation in summer and

winter, the heat distribution is coordinated, the use of odd unit as a five-door in the center of the facade creates a rhythm to make a source of heat distribution and defines a procedure for the same use of heating caused by solar radiation.”

Symmetry and balance in Iranian traditional home:

“Monuments which have remained from the past have several aesthetic principles including Iranian traditional homes coordination with the rich culture of this country as well as other aesthetic principles of Iranian traditional home can be considered the geometry in plan and interior courtyards view, order and arrangement in plan, the hierarchy in the plan, balance and rhythm in them” (Reca *et al.*, 2014). Symmetry is one of the principles that is seen in most monuments of Iran. In the Iranian house, many layers of symmetry either in general scale or in part can be found.

Although, the professor Pir Nia said in the context of residential and public buildings: “in the architecture of Iran, about issues that need to create glory, heaviness and etc., they used a pair (symmetry) and in homes and Belvedere that uniform and heaviness should be disrupted and creates newness, they used pod pairs (asymmetric). In general, this interpretation implies that the residential houses should be asymmetric but by looking at the meaning of pod pair in the Introduction to Iranian architectural style book (pod pair: asymmetrical, diverse, a job that leads to disturbing the symmetry), we realize that pod pair more means to poke symmetry and variety in residential architecture.

In addition, by looking at the architecture of the residential buildings in three cities of Isfahan, Kashan, Yazd, we find that in general, residential buildings, wherever there was no need for multiple courtyards for the diverse needs or the ground has square and rectangular dimensions or the house has a simple layout (four plates), it is built symmetrically and where the sides

of the earth are not flat and to meet the different needs in the building for other yards (“the number of yards in historic houses was variable according to their species and sizes. Houses have at least one courtyard that the inner rooms are placed around it.

There are three types of courtyards of houses: the main courtyard or interior, exterior yard and service yard. Or with the passage of time, according to the needs of the next generation, new areas are added to the building, residential building was not symmetric in general but in every yard and every side, symmetry has been observed, according to Dr. Sami and Radmard engineer, combination of rooms with this type of architecture follows the principle of symmetrical components in the asymmetric total.

RESULTS AND DISCUSSION

Based on levels of symmetrical pattern application in this study, we studied three levels of symmetrical pattern in Iranian traditional residential buildings that these three levels are:

- Checking symmetry in a whole and geometry of plans
- Checking symmetry in the facades and views
- Checking symmetry in other arts related to architecture (symmetry in parts)

Checking symmetry in a whole and geometry of plans:

The first level of symmetry patterns in traditional houses is symmetry in the whole and order of plans. In this case, according to surveys in the residential samples of Isfahan, Kashan, Yazd, we find that when the building is small and beta sides are almost straight, the expansion of symmetry on the surface of the plan goes as far as the floor allows. It does not need certain expenses and after that, it ends with matching the pattern of the floor such as Dr. Alam’s house and Haj Mosavarol Molki’s house in Isfahan.

Whenever the building becomes larger according to the needs of the family and has more courtyards and “whenever, the platform does not allow symmetric building hue mapping of the earth, the plan of the building will continue to grow symmetrically from the vicinity of the main axes as far as possible” (Reza *et al.*, 2011) as an example of Tabatabai’s house in Kashan, Martha Peters’ house in Isfahan and an ascetic house in Yazd.

Checking symmetry in the facades and views: “A Facade division has its own special features. The first feature is

the person’s divisions in the facade. In most traditional views, the divisions of the facade (3), (5), (7-doors) was odd, on the part of the façade house, the two-doors can be seen that probably is due to changes in other times, also split divisions in the facade will cause the shading in interior spaces (geographical feature dimension) (Fig. 4).

Tune and order in the division of facade are another façade index (Reza *et al.*, 2011). The symmetry in the interior in addition to easing the structural design and construct the building will regulate the facade and better visual understanding of the facade. This basic principle always has caused shapes in Islamic architecture that have certain center or axis which is the source of all components.

Checking symmetry in parts: One of the most important features of traditional arts is symmetry, because symmetry causes balance. In symmetry definition (full parity symmetry of two things is in terms of shape but opposite direction so that, if they will be on the routine look, they completely overlap with each other without low and high) of course, all the symmetry nature is the same but their extension methods are different.

“Origin of symmetry returns to nature and man is the best of it. The flowers, leaves, trees and the alternation of night and day show the tangible of symmetry. Dating back and using these elements in old civilization and inclusiveness in most civilizations, reflects the importance and need of man to the symmetry and balance, because symmetry (transfers such a sense of stability, strength to the viewer) and finally with establishing order, it adds peace and feeling of security (Nejad-Mahdi, 2015).

Axial symmetry which is also called bilateral symmetry has the most used in architecture and traditional arts, metal works of Lorestan, columns and Persepolis head columns, show this type of symmetry well (Fig. 5).



Fig. 4: The symmetry and odd proportions in view of traditional houses








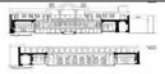










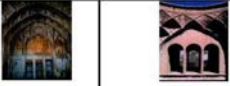
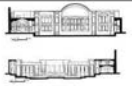
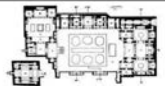

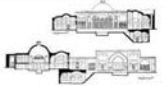

Consideration	symmetry in details	the symmetry of the facade	symmetry in plan	the symmetry of the houses in Iran
	 Interior and symmetric details	 Symmetric facade	 symmetric plans	House of Haj MosaverAlmaleki - Isfahan
Plan of building is asymmetric due to defective size of land	 Symmetric details	 Symmetric facade	 asymmetric plans	House of Marta Piterz - Isfahan
	 Interior and symmetric details	 Symmetric facade	 symmetric plans	House of Dr. Alam - Isfahan
Size of land is defective but is symmetric in plan ratio	 Interior and symmetric details	 Symmetric facade	 Relative asymmetric plan	House of Ghodsiye - Isfahan
Plan of building is asymmetric due to various needs and several yards	 Interior and symmetric details	 Symmetric facade	 asymmetric plans	House of Mozafari - Yazd
Plan of building is asymmetric due to various needs and several yards	 Interior and symmetric details	 Symmetric facade	 asymmetric plans	House of Mortaz - Yazd
Plan of building is asymmetric due to various needs and several yards	 Interior and symmetric details	 Symmetric facade	 asymmetric plans	House of Tabatabaei - Kashan
Plan of building is asymmetric due to defective size of land	 Interior and symmetric details	 Symmetric facade	 asymmetric plans	House of Al-e-Yasin - Kashan

Fig. 5: Checking symmetry in Iranian traditional homes in Yazd, Isfahan and Kashan

CONCLUSION

One of the important trends in Iranian architecture is symmetry. Many patterns such as four porches, four plates, porch, etc. are built based on square and rectangular shape and symmetry. Symmetry, as well as many aspects of Iranian architecture is known as the oldest spatial discipline by mankind and its root returns the basic knowledge of human from his organs and other natural phenomena.

In Islamic Iranian architecture, architects, instead of using the concept of symmetry, speak the geometry evolution; they believe, completeness of the whole without limitation for the whole is a key feature of Iranian architecture. So, in the space of Iranian architecture, we face a perfect geometric system that if in a place there will be no perfect symmetry, at least in a row, there will be consistent and any space combines with another space

with more flexibility. In Iranian traditional homes, the same sort of symmetry is in the discussion, it means either there is symmetry or balance by some symmetry axis as we have discussed in the text, some of the houses are symmetric in one or two axes and some houses that are spread because of family needs and over time and have multiple courtyards, have not a general symmetry axis and any of the courtyards have their own axis of symmetry and the result is in plan, the balance is in place. It is a proof of the flexibility in residential architecture while after examining the levels of the symmetry in Iranian traditional homes, it was found that most of the houses are not symmetrical as a whole and plan and cannot consider a certain axis for the symmetry but they are symmetrical in the names and components.

The willingness of Iranian architecture to modern patterns and repulsing the ancient historical heritage, made our today's architects of Iran face challenges in the

concepts of order. Cutting our traditional architecture transformation process has caused the loss of original and tested concepts of this border. It is hoped that knowing the foundations of order in our traditional architecture and using them in modern architecture, create a wonderful and creative environment, by using knowledge of the past.

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