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*Original Paper*

# Finding the Relevance of Music and Architecture in Shaping Physical Space and Structural Form of Prince Garden, Mahan, Kerman

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***Abstract***

*Finding the relevance between various arts, architecture, poem, music, miniature, painting and, etc., has long been proposed and widespread. The discovery of such a relationship among music and architecture is done, and has pointed to many similarities and differences. Most previous researches taken on this term, are only tangible limited criteria such as movement, rhythm, repetition, symmetric and less discussed the relationship between semantic and content. Architecture is the concrete form of abstract geometry, music is the audio form of abstract mathematics. Architecture is the use of proportions in the mass of space, music is the use of proportions in the length of time. Music like architecture is a multi-layered art that under the influence of the material characteristic, both artists need to be aware about each layer criteria to have a final artistic prominent product, though the whole product always seems to be perceivable. The aim of this paper is providing a kind of aesthetic conceptual assessment and expressing emotional states in the Prince Garden with the same created sensation in Homayon musical Dastgah visitors. Data is gathered through textual and library method and its analysis is by descriptive approach. Moreover, this process has begun with the aim of establishing a connection between music and architecture.*

***Keywords***

*music, architecture, Prince garden of Mahan Kerman*

## 1. Introduction

In classical Greek, Pythagoras and Plato where among the first people who founded and developed theories to demonstrate the relationship of mathematics, geometry, music and ultimately architecture. Music for the Renaissance architecture theorists has been a reliable and useful source. They often cited music in order to clarify their architectural concepts. In order to visualize his ideas about achieving beauty through diversity, Alberti has considerably used patterns of music. The architect must blend and unite the various components in a balanced, compatible style, just as it happens in music ... then, through the diversity of sounds, there is a harmonious amazing balanced unity of proportions that entices and intoxicates the feeling (Antoniades, 2007). Aristotle recognized music as a branch of Mathematics. In Iran al_Farabi, besides philosophy and logic had main interest in music. Ketab al_musiqa al_kabir or Great Book of Music is the most important medieval musical treatise in Islamic lands and also includes sophisticated philosophical sections. Some Islamic philosophers such as Avicenna knew it as part of the book "treatment". Goethe has been renamed Architecture under many titles, such as "Frozen Music", or "Silent Music" and it is also believed that each of these two arts pass through the same places and passages during their creation and both, according to Schopenhauer, ultimately lead to abstraction. Although their impact on each other can always be promoting and creative, which not only should not cause the artist's grief, but must admit that this connection in order to create long lasting and better works and to enrich the art of the artist is inevitable.

## 2. Literature Review

The harmony between these two arts, quoted by Georgiades the contemporary Greek architect, is a guarantee of aesthetic pleasure (Antoniades, 2007). Giorgiades, in the 1930s, introduced the relationship between the "Cannons" of music harmony and the settling of columns of ancient Greek temples. His studies and measure led to an enlightening result, which he summed up in a graphic diagram entitled "Georgiades Law of Architecture", which is based on the pleasure of the harmony that the eye experiences when viewing the Greek temples. Not because of the random behavior of the columns, but because of the deployment of the columns establishes a relationship with the arrangement of "columns/empty space", which is similar to a certain musical harmony (Antoniades, 2007) (Figure 1).

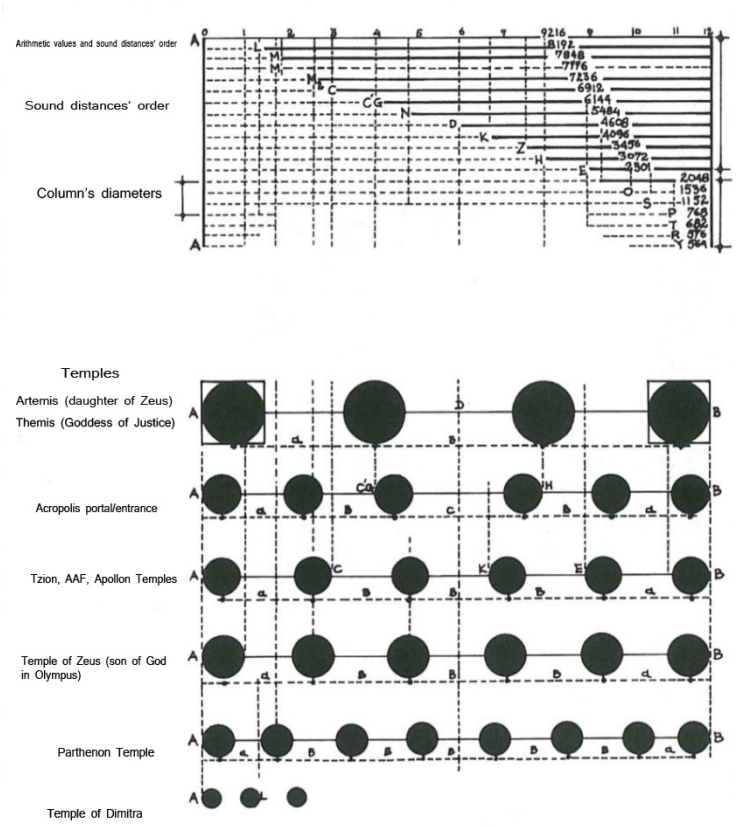


**Figure 1. The Law of Georgiades Architecture Is about the Ratio of Musical Rhythm and Architecture. The Columns of Temples (down) Are Equivalent to Musical Cannons (up). Investigate the Deployment, Diameters, and Arrangement of the Intervals between the Columns Is in a Manner in Which the Inner Relation between Them and Their Relation to the Whole Building Is the Same as Musical Harmony**

Hungarian musician Erno Lendavi, one of the best students of the Hungarian composer, Bella Bartok, has discovered that he coalesces the principles of ancient Greek architecture, such as the Golden ratio and five Pythagorean Principles, with the principles of acoustic harmony (Antoniades, 2007). Susan Ubbelohde of the University of Minnesota and Bennett Neiman of the University of Colorado in Denver, pioneered the use of music as an external guidance for architectural purposes in the 1980's (Antoniades, 2007). Figure 2 provides the breakdown of J. S. Bach's Chorale *Ich Bin's*, *Ich*, *Solite Buesse*. By means of Schenkerian Analysis, the chorale is broken down into the background layer, three middleground layers, and the foreground layer. The watercolor studies in Figure 3 take the principles of background, middleground, and foreground in order to create a spatial diagram of J. S. Bach's Chorale *Ich Bin's*, *Ich*, *Solite Buessen*. These studies show that a hierarchical layering of tonal analysis can inform the different systems of a spatial form. In this comparison between music and architecture, the approach of both a musical composition and spatial form develop through a similar progression. The background of a tonal composition can be spatial translated into the spatial

proportions of a structure, providing its physical support system. The middleground layers can then be defined to form different systems of circulation and programmatic elements within the construct. The final layer, the foreground, can then be defined as the detailing of the construct. In Schenkerian Analysis, this is defined as passing tones, neighbor tones, and arpeggiation within the tonal composition. In architecture, these principles are defined as the final detailing of the spatial elements of a construct. Such detailing serves the purpose of adding scale to the structure. In both music and architecture the foreground layer adds a refined quality to the overall composition.

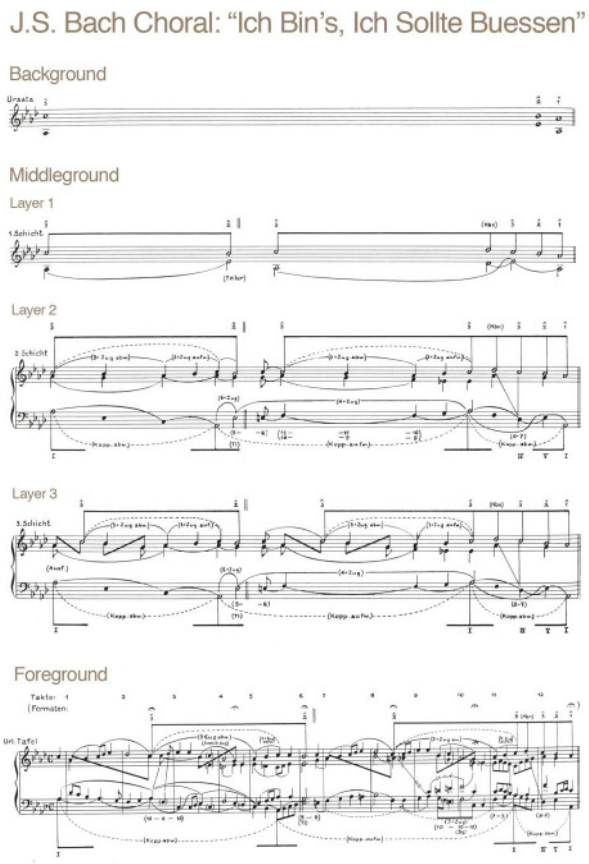


**Figure 2. Schenkerian Reduction Depicting the Background, Middleground, and Foreground Layers**

*Source*: Heinrich Schenker, Five Graphic Music Analyses.

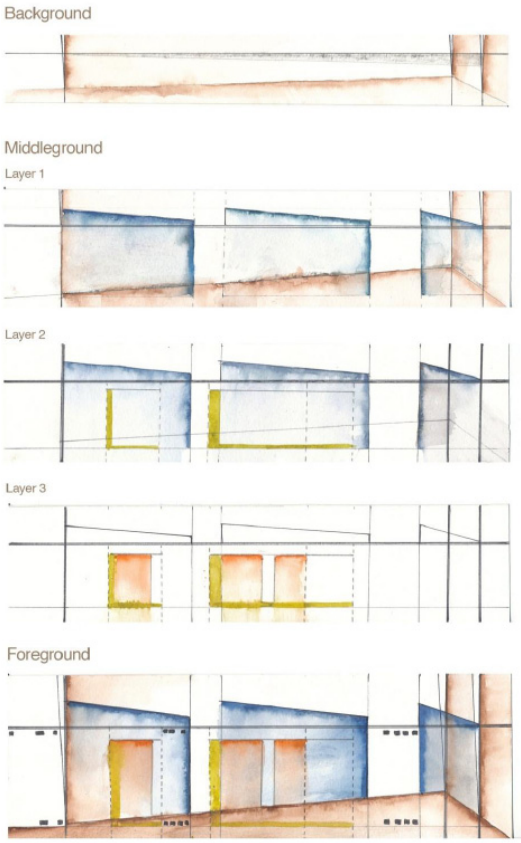


**Figure 3. Watercolor Diagrams of J. S. Bach's Chorale Ich Bin's, Ich, Solite Buesse**

In these watercolor studies, the structural framework of the analysis of the chorale has been spatially defined. The next step in the translation of music to architecture is to capture the intuitive nature and musicality of the composer. While its layering system of Schenkerian Analysis provides the framework for the spatial form, the experience of the occupant must be considered. Just as one experiences the musicality of a piece through the sense of hearing, one can experience this same element through a visual phenomenon in a space.

In many Iranian buildings, one can find the impact of Iranian Dastgahs and musical songs. It can be stated that the reason for the charms of Iranian architecture is the same embodiment of music in the material world. As you enter Naghsh-e-jahan Square from Caesarea Market entrance, and if you're familiar with Persian music, you can hear the Shoor musical Dastgah whispering. First, you can see the harmonious arches. This is the first part of Shoor musical Dastgah which is performed in some parts. Slowly, you go forward to Aali Qapu which is Goosheye Shahnaz, then we have Zir-Afkan and Foroud, you reach the Shah's mosque which is Goosheye owj and then Sheikh Lotfollah's mosque, it associates the Goosheye Salmak and again you come back to Caesarea Market entrance (Akhavan Saraf, 2004).

The music room of Aali Qapu (a Safavid palace in Isfahan, Iran) consists of acoustically noticeable architectural elements. It reveals the unique idea of interweaving beauty of architecture and science of acoustics in a hybrid context of form and fuction. Vaulted ceilings of mud brick are richly decorated

with painted, carved stucco and cutout Muqarnas. As it can be seen in Figure 5 cutouts on the surfaces of the Muqarnas in the shapes of ceramics and glassware have created delicate and fine surfaces which can also meet the acoustical characteristics of a complex and unique Helmholtz cavity absorber due to their various forms and disparate air volumes behind them.

**Figure 4. The Ceiling of Aali Qapu**

## 3. Research Methodology

Data collection is done in a field and library with descriptive-analytical research method, musical features of Dastgahs are recognized, examining and adapting these features and extracting commons and differentials with garden space and building elements are presented with photos.

## 4. Result and Discussion

The freshness and greenery of the Iranian garden and the aroma of certain flowers that can refresh the tired soul of man. The resonance of the wind In the thick of trees and the beat of water, all these parts of nature, the first music teachers of human and the songs of birds, the oldest form of music, have kept Iranians who are not just satisfied with breathing, consistent with their environment. Our ancestors have described music as the cause of the recognition of human being and healing of the soul (Khaleqi, 1937).

### *4.1 Straticulated Garden*

Straticulated garden which is one of the different kinds of Iranian gardens in architectural scale, is affected by the steep slope of the earth (Parna, 2006). Water movement in this kind of gardens was on the terraced path of the earth and in the form of small waterfalls (Shahcheraghi, 2010). On the top of hill or on the part of the mountain slopes which had a fairly smooth surface some of the needed mansions and spaces were designed and built. The surfaces and layers on the bottom of the hill is also considered as a place for elements and spaces with an appropriate perspective. The slope was often used as a green space as well (Nasr, 2010). The structure of this kind of gardens allows you to change the view points as the observer's altitude changes in different areas and regions, provides different

perspectives of the garden. This sense of space is rare in other Persian gardens (Khoyi & Gravandpour, 2003).

*4.2 History*

The first flat garden The Hanging Gardens of Babylon were described as a remarkable feat of engineering with an ascending series of tiered gardens containing a wide variety of trees, shrubs, and vines, resembling a large green mountain constructed of mud bricks in the ancient city of Babylon (Figure 5).

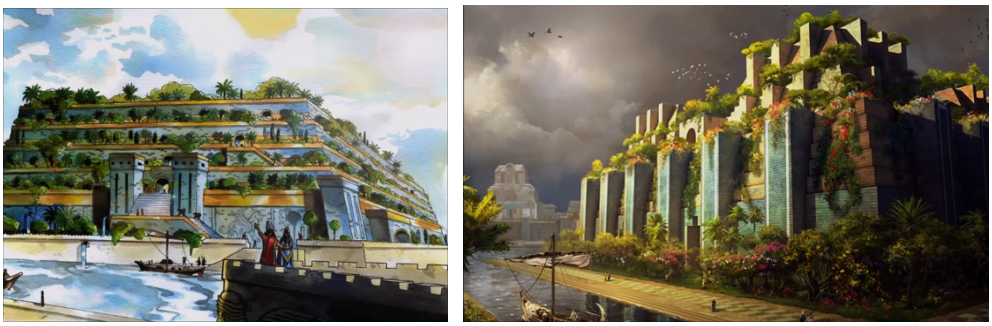

**Figure 5. The Hanging Gardens of Babylon**

*4.3 Description*

One of the main functions of the flat garden has been the state-settled one. Prince Garden is classified in this category (Shahcheraghi, 2010). The exterior mansion or court house, in the entrance so that one part was inside the garden and faced the interior, for the purpose of settling guards, gardeners and other employees and the place of employment of rulers and bureaucrats was considered to be governmental and administrative in such a way that the movement of people did not cause any disturbance for the owners of the garden and as a result, the privacy of domestic and foreign arenas was well preserved (Naeema, 2006). This space classification in the field of garden function is very similar to the division and order of the Iranian musical Dastgah.

**Figure 6. Prince Garden Aerial Photo**

The area of Prince garden is surrounded by a lofty wall. The inner world is in the dramatic contrast between the inseparable land and the understated landscape of the desert, surrounded by enormous greenery. Figure 6, this displays the contrast of the two environmental qualities. An oval large pond is located in a rectangular basin in the front of the entrance (Naeema, 2006). Figure 7 Crossing the plain, with all its integrated range and staying in the forefront, as if for the space-experimentor (to the author's opinion) associated Shoor musical Dastgah with serious and sensitive. The person is fascinated by the inner facts and moments and causes deep and sensitive emotions. The timely use of Shoor musical Dastgah drains the grief and reduces the intensity of worries (Arjmand, 2014). Reaching to the frontage space, the existence of the entrance of mansion with arches, painted and tiled facades in two floors, and the presence of water and trees, eliminates the fear and concern caused by the surrounding environment in the garden users.

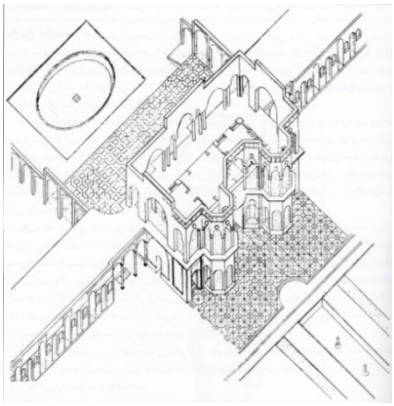

**Figure 7. 3D North Façade of Entrance Mansion of Garden**

*Source*: Tehran Museum of Contemporary Art—fall 2004.

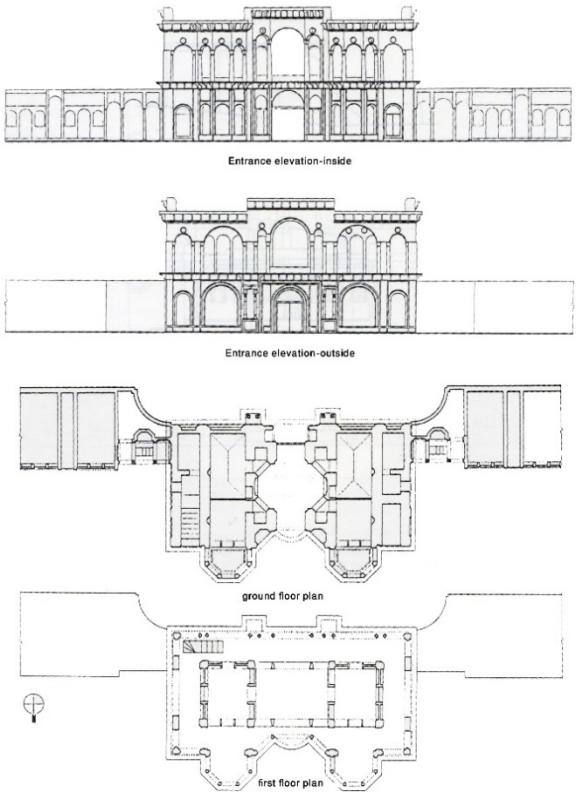


**Figure 8. Floor Plans and the Entrance Façade**

*Source*: Tehran Museum of Contemporary Art—fall 2004.

**Figure 9. The Entrance of the Mansion**

At the beginning of the main axis, the entrance to the two-storey "House of court", especially with the architectural transparency of the second floor Figure 9, is the interface between the external reality and the inner reality (Naeema, 2006). As if we have passed Shoor musical Dastgah to Homayon musical Dastgah. Homayon is a magnificent and luxurious vocal, but at the same time effective, attractive and enchanting. According to the author, is more solemn and more effective than other songs. Because his speech is full of glory and majesty and his advice is from the perfection of skill and experience. Its statement is magical and skilful. By listening to this song, the listener will remain silent and dare not to

speak (Khaleghi, 2007). The Homayon sensation responds well to the inner desire of romantical love and represents the state of mania. Sometimes the traits and motifs of this music are the best manifestations of the mystical demands and reflective spirituality of the Eastern mood. The maniac temperament of music can spread on both sides of grief and joy (Arjmand, 2014). As a result of hearing this song, man drowns the world of thought. If the player is skilled, he will lead the susceptible listener to the supreme world of matter in order to think about what is beyond body and material (Khaleqi, 2010). The construction of the garden is actually the manifestation of the promised paradise on earth.

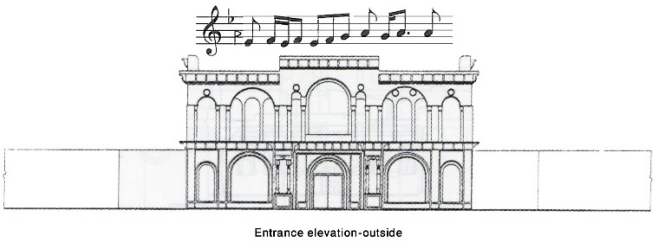


**Figure 10. Interpretation of Entrance Mansion with Homayon Musical Dastgah (Daraamad)**

**Figure 11. Entrance Vestibule**

A pause in a small and relatively closed vestibule in the entrance, on the same level, Figures 10, 11. As an introduction to the Daraamad of Dastgah, creates a marvelous sense of atmosphere and miraculous sensory conditions against the experience of the open space of garden. The entrance vestibule can be called the beginning note. The water stream entering the garden in the longitudinal direction of the garden, in the middle of it, forms the main axis in the shape of a large stream and waterfalls. The axix according to its main indicator, at both ends, is limited to the mansion and on the other hand to the palace and the symmetry of surrounding spaces has added to its centrality Figure 12. From a musical viewpoint (perspective), this central axix can be known as a witness note. The degree which is most emphasized on, has a central role, and the melody appears to be oriented toward it (Alizadeh, 2009). The vast expanse of water, the sound and jumps of water and their fountains add to the pleasance of

garden. The beat of water flow is the same as Goosheye Zange Shotor, which after Daraamad, resonates in the tangible musical space of garden (Figure 13).

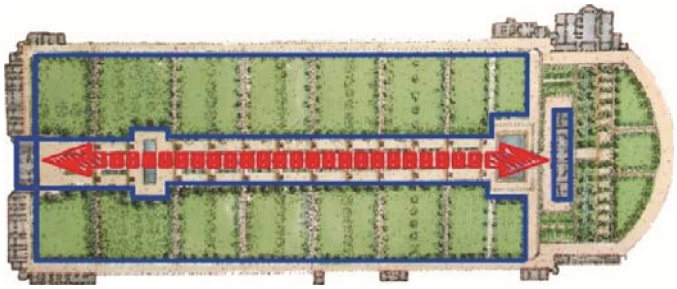

**Figure 12. The Prince Garden Plan**

*Source*: Iranian garden book (a reflection of paradise)**.**

It has been attempted schematically, to illustrate the upward and downward movement of water fountains in pond basins, based on the subdivision and modulation of the sound, in a diagram.

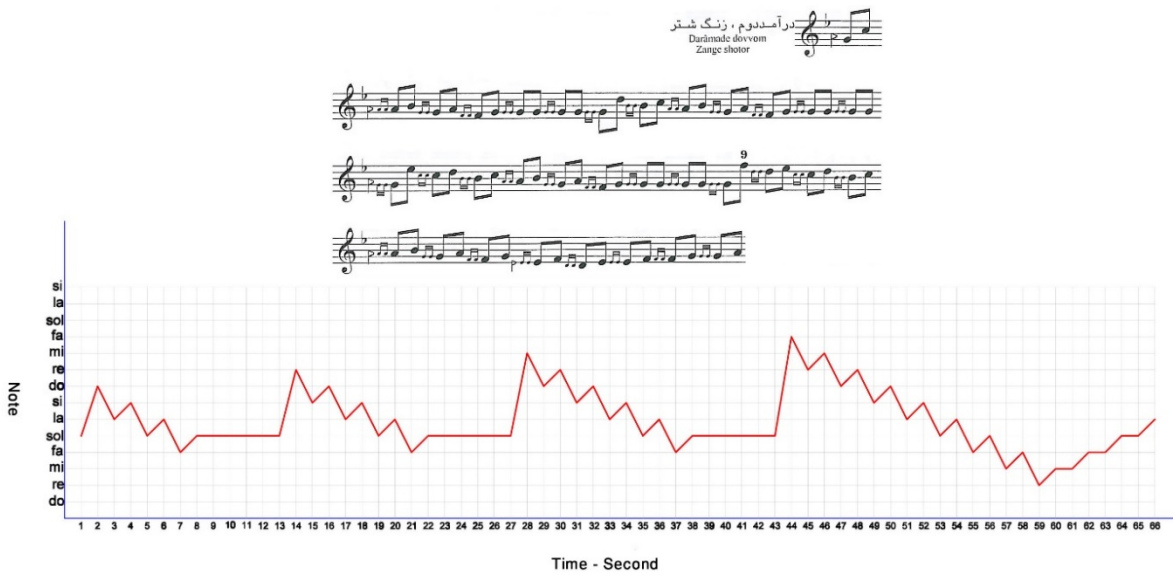


**Figure 13. A Schematic Diagram of the Variations of the Sounds (Modulation) in Goosheye Zange Shotor (an Allegorical of Water Movement in the Fountain Form)**

*Source notes*: Book of Radif of Mirza Abdullah for Santour, Pashang Kamkar.

Explanatoin: One of the features of the voice is modulation. To show it in music, the carrier lines are used. In melodic music, 5 carrier lines are numbered from the bottom respectively (Lines 1 to 5). The higher we go, the downer the sound of the note becomes. The notes are placed either on or between the carrier lines. There are degrees in the music where the melody stops. If the stop is temporary, so that the listener waits for the rest of the piece, it will be called stop. One Magham can have more than one stop (Alizadeh, 2009). Ponds can be considered as stops. The layout and its straticulated form, through

the level of clofts, exposed the garden's surface like a mirror. And so the simple relationship between the viewer and the flat ground becomes enriched, and the participation intensifies the role of the topography of the earth in the garden space.

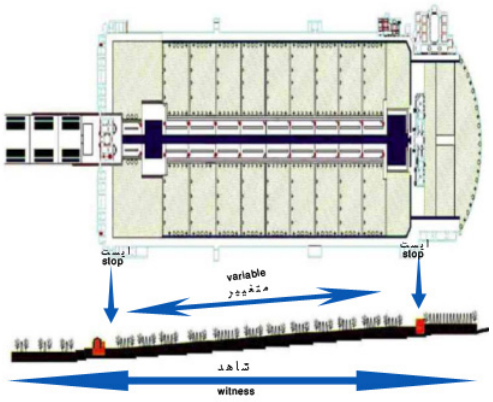


**Figure 14. Plan and Section of the Prince Garden**

Twelve surfaces appear one after the other. This difference in the level at the line of falls of waterfalls with certain steps can be traversed (Naeema, 2006). Passing this staired path, is similar to Chakavak, Abu al-chap, Tarz, Shoshtari, Bidad-e kot different parts of Homayon musical Dastgah. Every two of the levels, having a semantic relationship with different sixtette parts of Homayon musical Dastgah. This staired pathway that makes the passage and elevation change, can be considered as a note or variable degree. The variable degree is the one that its modulation changes during the piece. The change follows the attraction of adjacent degrees. This means that in upward and downward movements, to make this degree closer to the next, they change it. Change here is the same move from the stairs to the other stairs (Alizadeh, 2009) (Figure 14). Gradually, the altitude of the waterfalls decreases, relying on the reality of the Prince Garden, the size of the waterfalls increase the hierarchical view of the farther—the smaller and based on the illusion it adds to the depth of garden and creates a relative relaxation (Naeema, 2006). The flow of water, particularly in the pools in addition to emphasizing the axes the fountains and waterfalls along the garden provide clear levels on the ground to reflect other elements. Shadowy trees, which are selected from cedar, sycamore and poplar species, the two paths along main axis and also flowers on both sides of the creek and central axle walksides' waterfalls on all platforms and especially long row of flower boxes on the border between the highest platform (palace mansion) and the twelfth stair, besides emphasizing and intensifying the architectural features of Iranian garden space, are a reminder of the implementation of Goosheye Norous—e Arab, khara and Saba. Presence of this category of evergreen trees as a performance of this Goosheh in every season of the year in Homayon musical Dastgah. The latest wide pond with similar features to the first one opposite to the palace mansion, this time it reminds another rhythmic music which is Goosheye Bavi in the mind.

**Figure 15. The Palace Mansion**

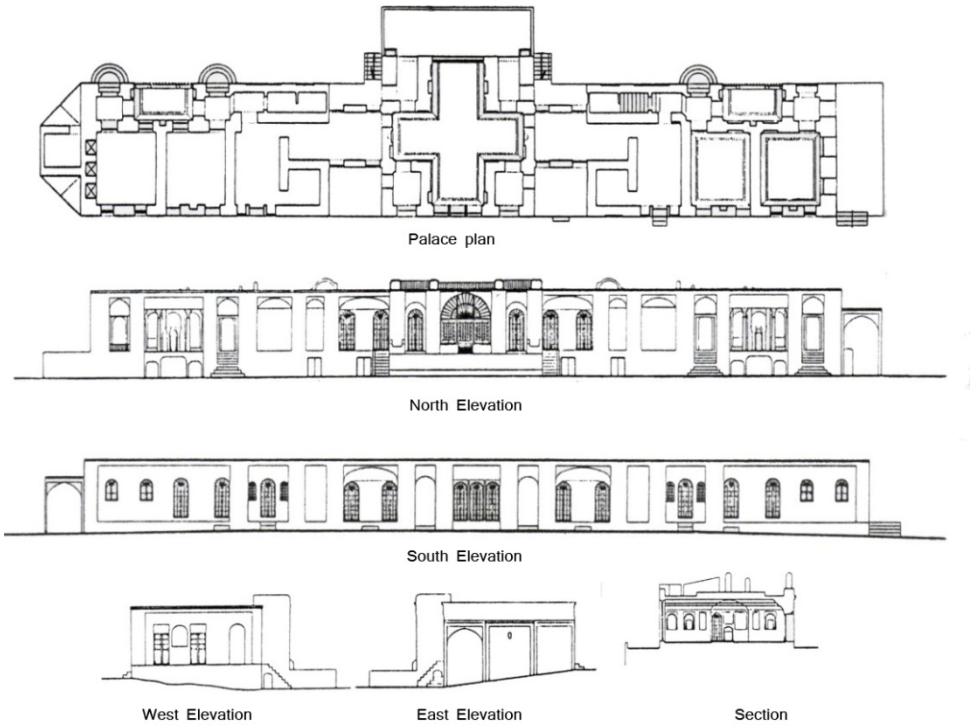


**Figure 16. Plan, Elevations and Sections of Palace Mansion**

*Source*: Tehran Museum of Contemporary Art—Fall 2004.

The top building (palace) Figure 15, the longest solitary place of garden, at the end of the main axis and perpendicular to it, in the final section and at the highest point of the garden from the spatial dimension, associates Jamedaran, which is played at the height of the Homayoon Dastgah. Walking along the garden from palace to the entrance, like reaching the final Foroud of Dastgah and returning to Daramad is an end to passing through the garden, this ancient relic of past ages and a termination to this music.

## 5. Conclusion

We provided a kind of aesthetic conceptual assessment and expressing emotional states in the Prince Garden of Mahan Kerman with the same created sensation in Homayon musical Dastgah. Arriving from the dry environment to the frontage space, having vestibule, ponds and fountains and (with upward and downward movements), repetitive straticulated geometry, waterfalls, the existence of symmetrical trees in rows, repeating the pond space, reaching the highest part of the garden, palace perpendicular to the main axis and passing the same route this time from the end to the beginning and returning to the start point, is the same as all that is formed by listening to an Iranian musical Dastgah in the mind of the listener. In architecture we move in space and in music in time. The architecture is the music of space and music is the architecture of time. The historical background subconscious mind appears in the bond between music and architecture on the way from appearance to conscious. The concepts and principles of architecture transfer and extand with the culture of a country throughout the history.

**Acknowledgement**

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