

AN APPROACH IN ANALYZING THE GEOMETRICAL COMPOSITIONS

(A Trial on the Ornamentation of the Carved Wooden Door of
Sungurbey Mosque in Niğde)

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In Islamic and Turkish art avoiding the depict of living creatures (animals and especially human figures) because of the religious prohibitions lead the artist search for new themes and use of lines in the graphical medias. Under these circumstances combining man's phantasy with the contemporary science of geometry became the geometrical patterns put into an original style of decoration. Sometimes these complex compositions tried to explain the fear of blankness (1) «horror vacui». And various ways of forming and the ways of inventing these compositions stimulated new interests in modern researches.

Geometrical compositions which are employed in nearly all the phase of the history show a brilliant artistic development through the ages of Ummayyades, Abbasides, Kharakhanids, Ghaznavids and the Great Selçuks. According to the geographical regions and the variety of low materials, different types emerged. The types which were applied in the brick work around Persian area, the stone work took place of the brick in Anatolia. Meanwhile, this production in Anatolia continues by giving notable examples both on tile work and wood carvings. The geometrical compositions which were applied to all kinds of materials and in every section of ornamented themes such as florals, scripts and figures all through the eras of Selçuks, Emirates and Ottomans without any interruptions.

In the history of art whenever we consider the geometrical compositions the patterns which seem difficult to analyze, are explained as if rather incomplete, meagre and in mere sketches.

The terms that are used, such as «interlaced», «utterly confused», and «arabesque» never qualify all the characteristics of these compo-

(1) K. Albarn, - K. Smith, *The Language of Pattern*, London 1974, p. 82.

sitions. For a detailed description, we have to use clear and standardized words.

To describe the types of geometrical ornamentations which are seen often in various art materials, depends on correct analyzing of the elements of the whole.

Whoever looks at the geometrical ornaments of Islamic art perceps them as a unified form and sees their general shapes immediately. Even though the interlaced construction cannot be perceived in all details, the type of the composition and its main lines can be recognized. The geometrical bands which seperates the limited tiny surfaces in the composition, shapes each of them as in indivisible parts. In this sense the composition expose to us as the visual effect of a complex group of polygons, stars and crosses which take part all through the Islamic world and also in the Selçuk and Ottoman works. At this step it is impossible to discover the sub-elements which are the integrated parts of the composition; but the whole scene become meaningful after an analyzing process. The main principles in analyzing is to separate the parts which have combined the composition in a systematic way. As this process continues, we realize that the sum of the parts increase at first, then they decrease, and at the end there will be only a few basic structural elements left.

The Problem of Creating The Geometrical Patterns In Islamic World

Organizing the point, line and plane in accordance with certain principles, we obtain a geometrical groups of forms (2) which take an important part in the aesthetic creation of Islamic world. We have no idea about the drawing methods of these compositions which were created all through the Middle Age in Islamic world and in Anatolia. There is not any document or evidence explaining how the Islamic artists made these linear organisations. Some of the art historians asserted that according to the same method of drawing patterns, these patterns appeared to rise at the same period of time which were common in Islamic countries (3). On the other hand, some writers accept that, to apply these geometrical patterns on the surfaces, they used sketches in small measures or they directly used the proportion 1/1 in creating these geo-

(2) I.M. Yaglom, *Geometrik Transformasyonlar*, çev. V.K. Güney, Türk Matematik Derneği Yayını, Sayı 34, İstanbul 1969, s. 1.

(3) D. Kuban, *Sanat Tarihimizin Sorunları*, Çağdaş Yayınları İstanbul 1975, s.44.

metrical patterns (4). E.H. Hankin who has made a research on the marble paraphets of Tac Mahal, realized that they used chalk, paper and moulding for producing them (5). All these hypothesis are based on weak and undersized assertions. In general, we have not been able to expose the graphical industry of Islamic world until now. Today, it seems impossible for us to understand which theoretical and graphical steps have taken place in creating these compositions. Concerning these problems, all the studies and attempts are not more than to adapt the modern drawing rules commonly know today. The reason why we consider the topic in few words, was to seek for an answer to the question of how they had the basic geometrical structure. For the time being, we still have no proof about the geometrical structures descending to Middle Ages. In our opinion, the original handcraft patterns were created with the help of a checkered paper and the artists put them in moulding forms and use them on many productions. In the actual state, it is impossible to reveal the producing process of how the moulding fixed and generalized.

Precise Drawing of an Example

Many art historians and mathematicians have a devotion for analyzing the geometrical compositions including more than one pattern in a certain system. It is obvious that we can even analyze the extremely complicated compositions by translating them into a geometrical language, if analyzing methods are selected properly. Whatever the composition is, it is necessary to draw the pattern correctly and it must be fitted on the paper before the analyzing process started.

For drawing a given composition, it is necessary to adapt the paper dimension by making the composition larger or smaller (in the proportions of 1/5, 1/10, 1/50, etc.) (6). The paper which the drawing process will be applied to, is a limited piece of course, that is why we must fix

(4) Bakırer, Ö., *Onikinci Yüzyılın İkinci Yarısından Onüçüncü Yüzyılın Sonuna Kadar Anadolu Mimarisinde Tuğla Kullanımı*, (Basılmamış Doçentlik Tezi), Ankara, 1977, s. 138.

(5) Hankin, E.H., «On Some Discoveries of the Methods of Design Employed in Mohammedan Art», *Journal of the Royal Society of Arts*, LIII, March, 17, London 1905, p. 462.

(6) The selected pattern may be worked up on an architectural surface or on a side of an illuminated manuscript page, In both cases, it is impossible to work on the original sample. We have to transfer the sample into a new and a suitable surface which we can work on it freely.

the composition correctly on it. On the paper the composition which is framed according to the dimensions of the original composition, the central point is also the central point of the geometrical composition. The corners of the paper must be taken as the secondary centers of the composition. If the pattern is a sectional area, which we are studying on, we can make an enlargement in our drawing. On the contrary we can draw only a cross section instead of drawing the whole composition.

Let's try to analyze an example in the sense of the principles as we have mentioned above and of course methodicaly. Our pattern is the wood carving ornamented doors which takes place at the middle of the north façade of the Sungurbey Mosque (1335/H.736) in Niğde (I11.1). In the Mosque, Gothic and Cyprus motives place on various architectural elements but the stone ornaments and the wood carvings directly belong to the Islamic tradition (7).

The uncorcondance between the wood carving work and the stone blocks decoration draws our attention at first sight. The composition which surrounds the door (nearly 2x2.70 m.) from three sides, is a very common Islamic ornament which is called interlaced octagons. An eagle figure is seen at the middle of the lintel. After this band, the inner band frame is a narrow spiral from and this plait continues through in «S» forms. The triangle corners of the arch are filled with palmette and rumi decorations (8).

Both, right and lefts wings are sectioned at the same proportion. Each wing is divided into three ornamental surfaces by a rumi band. At the top an inscription plate, which is highly decorated with spiral floral motives, takes place. Below, the plates which were at the same situation have disappeared today. Also the iron parts have been made in recent years. On the vertical rectangular parts of the each wooden wing, a huge composition takes place which we are mostly interested in. All these divisions and panels are prepared by cutting the shaped patterns and then they are all joined together (in künde-kârî technique) to form the whole composition (9).

(7) Gabriel, A., *Monuments Turcs D'Anatolie*, Tome Premier: Kayseri-Niğde, E. De Bocard, Paris, 1931, p. 123 vd, pe. XL/2, XLI/1.

(8) The stone work and the floral wood carving of script patterns must be taken into account. But, our topic is mainly the geometrical patterns which take place on the wooden wings, that's why we are not dealing intensively with the other trafts and plastirqualities.

(9) Öney, G., *Anadolu Selçuklu Mimarisinde Süsleme ve El Sanatları*, Türkiye İş Bankası Kültür Yayınları, Genel Yayın No. 185, Sanat Dizisi, 33, Ankara, 1978,s.114.

At first sight, eight-rayed stars attract our attention (Fig. 1). At each wing, two complete and one half of these stars are placed; and this arrangement shows that the whole rectangle plain is proportioned as 1×2.5 . After the eight-rayed great stars we notice the smaller five-pointed stars, hexagons, irregular quadrangles and octagons which can be seen as halves or quarters, take place after one another. All these divisions are separated by flued laths. The inside base of the geometrical shaped divisions are filled with floral palmet and rumi motives. The eight-rayed central star (Fig. 2), the decorated rays of this star (Fig. 3), five-rayed stars (Fig. 4), little quadrangles and semi-octagons (Fig. 5) are exhibited to us as a rich floral world of motives.

The necessity of crafting the wings into two, separates the composition too. Actually, the design which takes place on the two panels can be removed towards the vertical door joist, and can be fixed there (Fig.6). So, we have completed the composition in this way (on the paper); the half-octagons (Fig. 5) and stars defined and transformed into recognizable shapes. Four great stars by touching the rays to each other form a four elemented group which are placed on the right axis from their ray tips. At the middle of this group by joining the rays on the diagonal axis an octagon emerges. So, the composition, which is applied to this wooden wings is an eight-rayed star which has infinitive characteristics.

We must checkered the drawing area in order to draw the composition correctly (Fig. 7). The point M is the point where all the diagonals of a square intersect each other and it (M) is also the center of the circle in the square. At the middle of each four circled group we draw a smaller circle that defines the octagon (10). Thus, the tangent circled system, which is a secondary drawing element of the composition, defines the situation of the eight-rayes stars and octagons.

As the drawing goes on; we can place the eight-rayed stars by the help of the circled system, on a checkered paper. The system is not the composition itself, but it is an analytic concept which reveals the structure of the composition. The term composition is an aesthetic term which defines the characteristics of the decorations. According to this, various compositions can be constructed in the same system. These patterns may be quite different from each other but, if the geometric ele-

(10) In the geometrical structure we may symbolize many of the stars and polygons as circle. Circle is the homeoform reflexion of all these forms. (Godeaux, K., *Çeşitli Geometrilere*, çev. F. Şemin, Türk Matematik Derneği, Sayı, 47, İstanbul, 1965, s. 192).

ments are repeating themselves on the axis according to a definite rhythm, the systems are the same.

By drawing the basic geometrical elements correctly, in general it is said to solve half of the problem. The circle which signifies the eight-rayed star is divided in the formula of $360^\circ : 8 = 45^\circ$ and marked on it. The points which are extended from the center cut the circle and show us the tips of the rays. By repeating the same process in the inner small circle, the central eight-pointed star is fixed. The points of the central star exist by the paralel lines which shapes the rays of the big star. We draw an octagon inside the circle in order to make the rays have pointed ends. By extending the radial lines which shape the rays of the big star we obtain an octagon, which is situated at the middle of the four starred group. After we have materialized this process, the secondary drawing lines will be erased.

Whatever the dimensions are; each particular pattern is an integrated part of the whole and they are also the geometrical units which have meaningful forms. The units which are emerged by the help of the basic geometrical elements such as angle and line, constitute the construction of the composition. These units can be divided into sub-elements in order to analyze the construction of the lines. And it is vitally necessary to define the characteristic movements of the lines in the construction.

Analyzing The Composition

As for the wooden wings of the Sungurbey Mosque in Niğde, the preceding rank is not an analyzing process but, it is only a correct designing of the patterns. At this step we design the original pattern on a paper by using the recent drawing methods and materials. The process is not more than a precise copy in a certain scale. We do not need to know the analythic construction of the pattern for such drawings. Analyzing is completely a different kind of process but, while we are defining the composition it helps us to discover the problem of the «character and the original characteristic of the lines which are shaping the forms» in later steps. By the method of analyzing we make a research about the problem of the parts that constitute the composition and how the lines intersect each other and how the linear system supports the composition. In this process the movement works backwardly.

Since the schema imitates the original pattern exactly, we may attempt to do the analyzing process. If we follow a random line in the

schema without any interruption, we can see that the line advances through the composition by a making regular angles and articulations (Fig. 8). As it is seen in the figure, although the lines which are numbered as 1, 2, 3 and 4 are tracing in different directions, but we can symbolize the series of the regular angles in the same formula. The line element which can be seen althrough the composition moves into zig-zags by making 115° and 135° alternately to left and right. Each line after refracting seven times and forming a bow, returns to the same original point on the axis. The same line refracts symmetrically on the other side of the axis and continues it's course. This movement circulates infinitively. Eight of the zigzag lined system pass around the same center so that, eight-pointed and eight-rayed stars and intermediate divisions, which take place among them, emerge. The order of the angular refractions never changes; the changing only takes place in the direction of the lines.

So, this analyzing process shows us that the composition is emerged out of the intersecting lined system. Many people who perceive the composition at first sight, define it according to the visual effects of the patterns. A geometrical composition might have been constructed with quite different kind of sub-elements, that is the reason why real analyzing must discover the subdivisonal elements directly.

But the point which is obtained at the end of the analyzing process, will be same in common. Because the analytical solution will be continued till the most simple and the last element will be obtained. Thus the last element is the element which gives the system it's name.

In the Sungurbey case, zigzag lined system bodied the eight-rayed stars and these stars occur the composition by making a serial order on the right axis. Like in this trial, the basic lines of the composition occur by analyzing, and each point, articulation and cross section come to surface with all their details.

In the researches of art history, it is possible to reduce the structural elements with the help of an evolutionary method for such patterns as we have just mentioned above. And we may generalize this principle for similar exemplar. Therefore, in a certain field of an ornamental art, we believe that it is being approached a little bit more to a clear and a definable media as far as we are concerned.

