Star and Scintillation, an Implicit Reality of Golden-ratio in the Muslim Architectonic Ornamental Motifs

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Abstract

Star is the enigmatic shape in ornamental designs, especially those bedecking the Muslim edifices. Intricacies of its geometric shapes combine unity within disparity, the substrate of which lies in the Golden Ratio, which is the building block of nature. Best in the Subcontinent, in this context, are the Mughal structures, and at their meridian is the Wazir Khan Masjid in Lahore. The mosque is a repertoire of multifarious motifs, but the researcher has focused the star-shape only. Because the complex geometric configurations filled with organic forms, compose perfect six or twelve-pointed stars, on its domed ceilings. Multidimensional shapes are so unerringly distributed over the domed-surfaces that slightest error in the formation of a perfect star is not discernible. Through formal and textual analysis the undercurrents of the star-motif will be explored, tracing its links with Golden-ratio. Connotation of light, the cause of scintillation will also be explored on ontological terms, for, star and scintillation are synonyms. It will be the multidisciplinary research, which is both scientific and connotative, the former deals with structure of the star-shape and the latter with its luminosity.

Keywords: Stars, Islamic Art, Umayyad, Mughal, Wazir Khan Mosque

Aniconic character of Islamic Art is mostly promulgated for its non-figurative character, especially when religious edifices are adorned. Secular structures are exempted from that, as specimens of the figurative were discernible from the palaces of the first Muslim dynasty that is Umayyad. But Islamic Art is venerated not for the iconic but for its aniconic character because it does not come at clash with religious interdictions against image making. The novel turns that aesthetic brains took as substitutes of the figurative were their focus on the fields of calligraphy and ornamental designs, and both were developed to the

unprecedented heights by the Muslim artists. The Islamic designs are unrivalled specimens of intricacy, beauty and inexhaustible source of creativity. The repertoire of these motifs is so vast that it is beyond the scope of the study, so only the star shape, for its scintillation is focused here, as origin of both is from the celestial spheres.

Fig. 1 - Stele of Naram Sin, (2250 B.C) (Star Worship). Louvre, Paris. https://www.pinterest.co.uk

Luminous stars adorning night skies have fascinated man from the antediluvian times, and contemplation on them devised their numerous interpretations, both phenomenal and noumenal. At places, man venerated stars as objects of worship by linking supernatural powers with them, associating them with his future courses, and on the other hand designed it into a piece of adornment *fig.1. The Stele of Naram Sin*[1] of Akkadian Period (2350-2150 B.C), of Mesopotamia, delineate the concept of star worship in ancient times. Broadly speaking, two main functions are attached with stars that are adoration and ornamentation. Scientifically speaking stars are substantial objects of nature, but their scintillation, having affinity with light, keeps connotative values as well. But the beauty of stars lie only in their luminosity, because the spectrum of their lights

[1] Naram Sin (2261-2224 B.C.) was the last emperor of Akkadian Kingdom and the grandson of Sargon (2334-2279 B.C) who laid foundation of this empire.

produce attractive shapes of five, six, eight, ten, or twelve-points, inspiring geometricians to expand novelties in their creative endeavours.

This is to be borne in mind that planets are either round or elliptical; no other shape is associated with them, for their capacity to remain continuously in motion. Motion and circle are linked together, and ceaseless motion is attributed to the circular path only. No other route on rectilinear direction can have the limitless capacity of motion. Scintillation, on the other hand, breaks continuity of roundness, providing a variety of facets to the surface of planets, converting them into pentagon, hexagon, octagon, decagon, or dodecagonal shapes, *figs.2-3*. It directed the cerebrating minds to explore the realms of geometry. On the other hand, diamond[2], one of the most precious gems is a piece of carbon, and so is coal. Value of a diamond increases with its cutting into a variety of facets that give luminosity to its surface but nothing likewise happens with coal. The value of diamonds or of stars owes to their shimmering quality.

Scintillation of stars is subservient to their motion in light that turns their rigid round-shapes into multi-bezels and glowing properties. Thus light and motion adds beauty of scintillation to their plain surfaces. Diamond too, is valued for the glowing outburst of rays on its multi-faceted surface. Thus, shimmering quality is attained by a body, if light strikes on its unequal planes, luminosity of which composes attractive geometric shapes. Likewise is the case of diamonds, precious stones and stars. Diamond scintillates, and its sparks turn its shape into multi-pointed stars. Hence, the main role is played by light. The gem will lose preciousness if devoid of its usual glint and a planet will also not be discernible as a star without its twinkling. Therefore, phenomenon of light must be studied, and it is researched here on ontological terms.

[2] Diamond is crystalline carbon, the hardest known mineral, usually nearly colourless. Degree of its transparency defines the value of its preciousness.

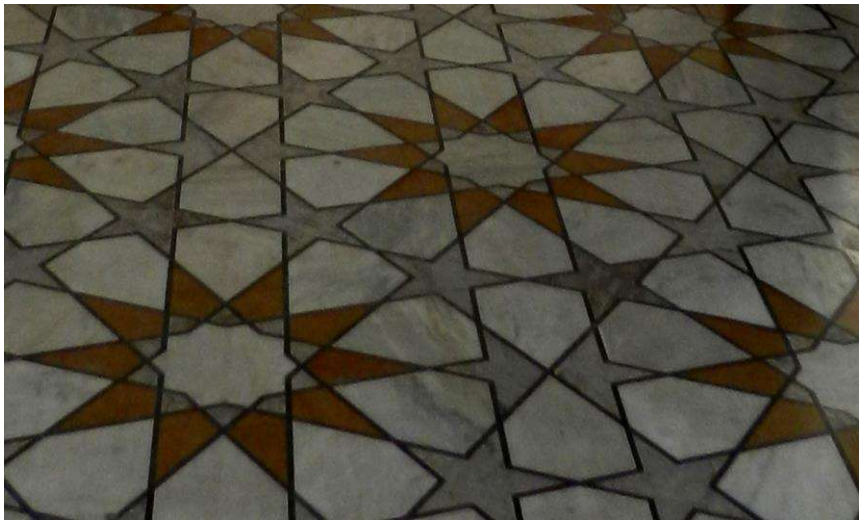


Fig. 2 - Floor of the Shālāmār Garden, Lahore (Photo by the Author).

Light is an enigma that induces life and beauty on the planet earth, and also in the entire cosmos. If there is no light, comprehension of existence of everything along with the aesthetic realms of man would remain blank. Light determines scintillation too. Hence, it engenders beauty and veneration, for being the only corporeal element that can be linked with the Supreme Being. No other object of the earthy sphere can be associated with the Supreme Reality that led scholarly brains to explicate it esoterically.

Among the Greek philosophers, Aristotle put forth the hypothesis that light is an amalgam of colours, which is empirically proved by the modern science. It is a phenomenon that has engaged scientists to experimentation for centuries and still new discoveries are being added day by day. But it is always linked with sight and its functions, whether viewed on epistemological terms or on ontological basis. At the earliest, it was claimed that light emanates from the eye and makes things discernible. The hypothesis was declined giving credit to some external sources of light that make things manifest to the eye. For long, it was considered that light moves in continuous rays, but then proved to be travelling in discreet packets, which are labelled as quanta. A continuous list of discoveries is linked with the phenomenon of light, defining its wave lengths or frequencies,

reflection and refraction. Even speed of light is marked as 186000 miles per second (Ronchi, 115-199) that makes possible to view scintillation of stars from so far a distances. Apart from the scientific it is explored on esoteric grounds as well.

Fig. 3 - Stellar Motif under the Eave of a Balcony, near Wazīr Khān Mosque (Photo by the Author).

Light has been an object concentrated not only by scientists but by philosophers, mystics and *ṣūfis* of different faiths as well. It is used by the latter as a metaphor for positivity, knowledge and guidance. However, darkness as its opposite is associated with negativity and ignorance (Qur'ān; VI[3]: 91). Theosophists place transparent beings through which light penetrates at superlative degree while grosser bodies that cast shadow are located at lesser degrees. Shadow is not revered by any, for being incapacitated to make things manifest, while light is venerated both on intrinsic and extrinsic terms. It is the very cause of choosing star with its scintillation as an object of adoration in many cultures, and of adornment of religious edifices, especially by the Muslim artists. The Muslim scholars wrote volumes to explore

[3] *Sūra: al-An'ām*

undercurrents of the reality of light, for being linked with the Supreme Lord. Only, crux of the conceits of al- Ghazāli and of Shahāb al-Dīn Suhrawardi are concentrated in this paper to unfold the cause of evolution of intricate star-shapes that ornament the Muslim edifices.

Al-Ghazāli (1058/450-1111/505) explicates upon the metaphor that "Allah is the Light of the heavens and the earth" (Qur'ān; XXIV[4]: 35), and His Light makes all things manifest. He analyses light, both on physical and esoteric grounds. Light is taken by him as the only *Real-thing* in the entire cosmos, and it is linked metaphorically with eye or intelligence. Apart from taking it as a tool, capable of making things visible, he views it as a phenomenon comprehended through senses, especially by the supreme sense sight. In relation to sight, al-Ghazāli categorises objects into three classes; the dark objects, incapable to get visible at their own, independently visible but incapacitated to illumine other objects, like stars and un-blazed fire. The third group includes those objects that are self-radiant and emits light to illuminate others, like the Sun and the fire ablaze.

Al-Ghazāli associates light only with the objects of the third category for being a source of generating light and illuminating exteriors of grosser bodies (al-Ghazāli 80). Because they do not borrow light from any other source, rather furnish it to others. He asserts that "unless a thing is manifest in itself, it is not manifest to others" (al-Ghazāli 103). Light in this sense is placed as the only genuine object that makes everything perceivable. Luminous beings are given higher value for being devoid of shadows, while those illumined from any borrowed source keep shadow as their integral part. Thus luminous and illumined cannot be placed at equal levels. In this context, al-Ghazāli has provided both phenomenal and noumenal interpretations of light. Phenomenal light [5] always accompany shadow. The metaphor of darkness interprets ignorance and wickedness, and light is associated with piety and goodness (Qur'ān, II: 257). It is the very reason that shadows in Muslim Art are altogether ignored. Hence, the stars

[4] *Sūra: al-Nūr*

[5] Phenomenal light is the light of earthy world. It is opposite to the noumenal light which is of the celestial spheres.

represented in their designs are luminous beings, not the illumined ones, for; they are devoid of any shadows.

On similar grounds, Shahāb al-Dīn Yahya ibn Ḥabash ibn Amirak Suhrawardi (549/1154-594/1198) interprets light with the metaphor of wisdom, and places it as analogous to theophany. He also interprets light on both phenomenal and noumenal terms, and elevates the latter, which he calls *nūr*, comprehension of which is beyond human senses. All the earthy and incorporeal beings are categorised by him for the degrees of light and dark with which they are composed of. Those of the incorporeal world are entirely constituted by light and the grosser bodies of the corporeal world are lesser in their composition of light, as they accompany shadow too. The absence of light is called by him as *zulmah* that is nothingness. Light is the most conspicuous reality that makes understanding of everything possible. Primordial light, which he calls as *Nūr al-Anwār*[6] is the fountainhead from where all bodies receive light, which subsists forever. It is not fleeting like earthy light but remains constantly luminous. Suhrawardi categories all beings in accordance to the degrees and types of light they receive from *Nūr al-Anwār*[7]. In esoteric sense, he classifies all beings for their degrees of intelligence defined through the amount of light they contain; either generate or receive.

All the earthy or non-earthy beings receive their light from *Nūr al-Anwār* that also keeps its vicegerent in each realm that seems to be self-illumined due to the highest intensity of light it emits. The Sun is the deputy of *Nūr al-Anwār* in heavens, fire in the earthy sphere and *nūr-i ispahbād* [8] in human soul. Because human soul is not a substantial thing, rather it has affinity with the spirit of the Supreme Being. Since, it is composed of light that is *nūr-i ispahbād*, so, it is

[6] The Light of all lights

[7] He gives two major divisions of light. If light persists by itself, it is essential and real light called *nūr al-jauhari*, which is incorporeal and its in-corporeality is called *al-nūr al-mujarrad,* such as God, angels, archetypes and the human souls. It is called accidental or *nūr al-arḍi* if derived from another source, it includes fire. If it is ignorant of itself but exists by itself, it is also obscurity that persists in all natural bodies. If it is ignorant along with depending on another for existence, it is a form like colours or smells.

[8] *Nūr-i ispahbād* is Lordly Light

inclined to light and repulsive from darkness (Nasr *Maqtūl* 387-88). In other words, it is attracted to knowledge and repulsive to ignorance. It is the very reason that scintillation of stars is used as the most popular motif to adorn Muslim edifices, which is usually stated as the "star, solar or stellar motif." It is in reality, not the star but its scintillation, inspired from light, and bedecking a large number of monuments of the Muslim world. It is not the elliptical or round shapes of stars that adorn those edifices but the shapes produced by their scintillation. The light that they emit produces multi-faceted formations that devise multi-pointed beautiful stars.

Fig. 4 - Geometric and Organic Forms to build Star Motif, Wazīr Khān Mosque (Photo by the Author).

Many western scholars like Hillenbrand (18), fascinated by the complex balance of the "stellar motif" have tried to explore its symbolic meaning. But they remained unable to attach a connotative value to its complex equilibrium (Hillenbrandt 18) because they focused only the star and ignored its scintillation, caused by light.

While in the Muslim theosophy the symbol of light is used for knowledge and intelligence, on the grounds that everything has emanated from the Light. Theosophists of Islam have devised a hierarchy of beings from the celestial to the terrestrial realms that is from the all illumined to the grosser elements. As Corbin explicates that the "first being in the universe to emanate from the supreme Principal is a light which contains all lights (because all light is created from it). The Light is described as the Throne ('Arsh), the Intelligence. ..." (Corbin 199). Innovative use of the stellar motif, in a variety of ways, on the secular as well as religious edifices of Muslims is due to the sanctity assigned to light by the Muslim theosophists.

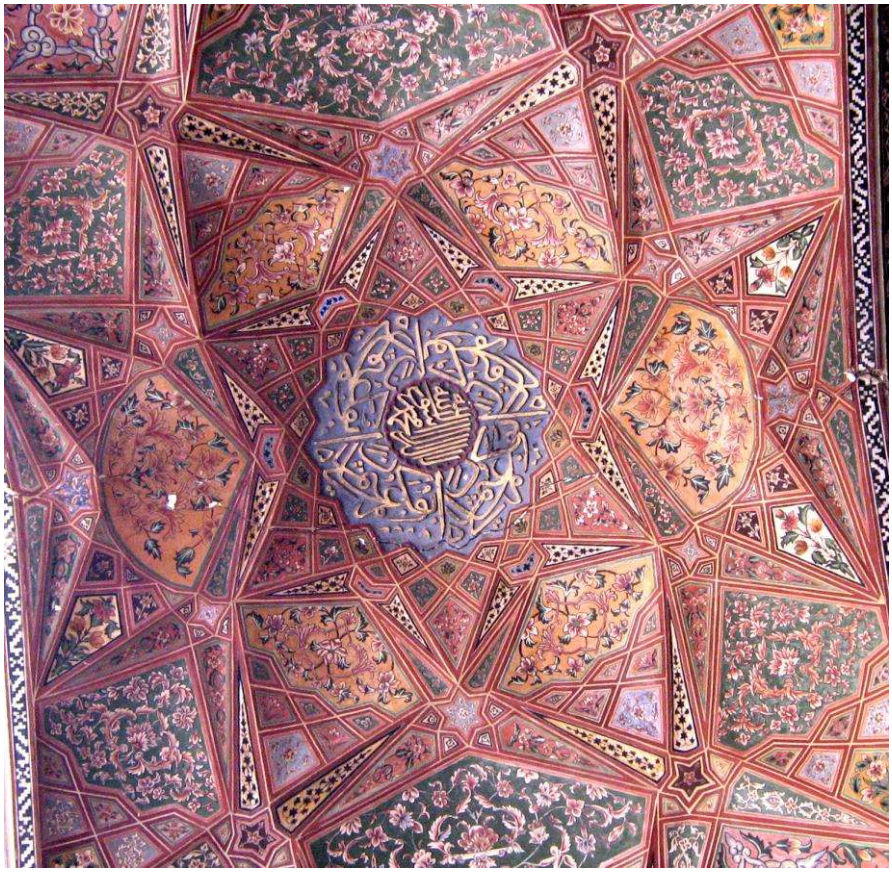


Fig. 5 - Intricate Stellar Design on the southern Īwān of the Sanctuary of the Wazīr Khān Mosque (Photo by the Author).

Despite the fact that Islamic ornamental designs are fundamentally linked with functional arts [9] (Humbert 11), they are part of the representational art [10] too. But all the shapes and designs, whether organic or inorganic, vegetal or geometric are derived from the objects of nature or transformed from them, *fig.4.* If not mimetic in their representation, these designs cannot be called as non-representational form of art. With deeper concentration of nature these are shaped into designs by those artists who have capacity to view undercurrents of reality. Substrate of the entire repertoire is on the mathematical building block of nature that is golden ratio, analysed and synthesized into novel shapes and forms but all abstracted from nature (Humbert 19). Once organised into novel configurations, these are expanded in variety, and then by attaching with other shapes, formulated striking forms of ornamentation. Likewise are the intricate star-shapes ornamenting the ceilings of the *īwāns*[11] of the Wazir Khan Masjid with geometric and organic forms that are rhythmically and aesthetically combined together to shape the stellar motifs.

It was in reality the scintillation of stars and planets that attracted the artists so much that their ornamental forms received intricacies of highest order. Because shimmer has no continuous shape, it emerges from the fluctuation of various intensities of light that the objects reflect. If value of their light remains constant, it can illuminate but not scintillate, and the round star cannot appear multi-pointed. Fluctuation in their reflected light converts them into the geometric shapes of pentagon or hexagon, etc. which can be mathematically calculated in Muslim ornamental designs. Devising a simple star does not need much concentration. But when its shape is split into a variety of geometric segments without distorting its perfect proportions, it requires deeper contemplation, which is thoroughly done by the Muslim artists. Moreover, geometry is restricted to certain rules that are quite rigid and can be a hindrance in the aesthetic domains of art,

[9] Aesthetic object that perform utilitarian function, meaning objects of utility like architecture or utensils

[10] Aesthetic objects (painting or sculpture) that refer to the objects from the real world or in other words objects which are purely pieces of art

[11] Īwān is a domed or vaulted place or hall, walled on three sides and one end entirely open (Mahmood 184)

but these rules are so elegantly devised in the designs that the element of beauty and elegance is not lost anywhere. Greater freedom of artistic expression is provided to the artists, but still perfect representation of these shapes is indebted to geometry.

Fig. 6 - Scintillation in Scimitar like flashes, Wazīr Khān Mosque
(Photo by the Author).

Algebra is a Muslim invention and geometry practical versions of mathematics. Besides being mathematical, geometry, at many points has provided strong basis to the Muslim aesthetics. In the delineation of a star shape, geometry plays essential role, maintaining rhythm and balance of highest order even in their segmented splits. Scintillation of star is replete in Muslim designs that can be viewed from the edifices of Umayyads (661-750), Abbasids (750-1258), Samanids (819-999),

Ghaznavid (977-1186), Saljūqs (1037-1194), Mongols (1258-1333), Nasarids (1230-1492), Timurid (1370-1570), Safavids (1501-1722), and Mughals (1526-1857) etc.

Fig. 7 - Complexities of Intricate Star on the northern *Īwān* of the Sanctuary of Wazīr Khān Mosque (Photo by the Author).

Intricate star-shapes, in this case, form most attractive designs which are composed of agglomeration of a variety of geometric configurations. A single intricate star is organised by divisions and subdivisions of wedge and diamond shapes, triangles of various dimensions, pentagons and hexagons, of a variety of sizes, including tiny stars too. However, these are combined to form the extremely perfect star. It is always highly symmetrical, despite its variety of subdivisions of shapes and sizes. It amazes probing minds because these designs are specimens of multiplicity into unity and unity into multiplicity, *fig.5*. Intricate star is actual manifestation of the implicit reality of scintillation. The variety of small geometric shapes that form

intricate stars, devise the undercurrents of scintillation, the only reality that turns their circles or elliptical forms into pointed scimitar like edged formations of stars. Sparks of light emitted by mobile radiant bodies formulate incongruous geometric shapes that are always pointed at one end, called rays of light. They radiate from luminous objects in piercing flashes, broader in size near their places of emanation, gradually decreasing in breath and getting sharper and sharper at their end points *fig.6*. Although, rays emerge from a body having uniform luminosity, but spectrum of one ray differs from the other, which brings the impact of scintillation, and formulate the shape of a star. Similar is the case of complex star-shapes of Muslim ornamental designs. Analysing one, adorning *īwān* of the sanctuary of Wazīr Khān Masjid, one can comprehend the connotation attached with light and also with its scintillation.

Fig. 8 - Three Circles of star cum Flower Formations on the northern *Īwān* of the Sanctuary of Wazīr Khān Mosque (Photo by the Author).

Fig. 9 - Twelve Pointed Star on the northern Īwān of the Sanctuary of Wazīr Khān Mosque (Photo by the Author).

On the domed ceilings of the four *īwāns*; two on either sides of the central one, which is the fifth *īwān*, the marvel of complexities of scintillation is delineated. It is a hexagonal star, composed of lozenge, wedge, trapezoid shapes, triangles, small un-equilateral octagons, fan shapes, and tiny stars embedded within the geometric shapes. All the shapes are of many different sizes, jointly viewed as a star with its scintillation, based on three-fold symmetry. It radiates from the apex, and concentric to it has six circular formations, from top to the lower edges of the dome, each circle composes a scintillated star shape, *fig.7*.

The central one has twelve scallops, surrounding it is a six-pointed star, around it has another six–pointed star cum flower shape, encircling it is another round of twelve-pointed star shape, then another round of six pointed scintillation, and yet another round which is the outer and the lower most has the twelve pointed star shape. The multi-layered six and twelve pointed transformations make it the object of concentration and interest for the observers. These are composed of a variety of geometric shapes, mentioned above. The most interesting point is that six circles from the apex of the dome to the edges of the arches make six rounds of twelve and six pointed alternate stars. Let's have detailed description of this section.

Fig. 10 - Six-Pointed Star Formation on the northern *Īwān* of the Sanctuary of Wazīr Khān Mosque (Photo by the Author)..

The top most central part of the domed ceiling has a simple small star of twelve scalloped-edges, filled with multi-layered petals of a flower, shaded in red colour. It is surrounded by another six-pointed star, made up of green stems and leaves, and on each of its six points is an alternate blue or pink flower. It is further surrounded by six-pointed pronounced flower like star- shape in pink colour, *fig.8*. Around it is another twelve pointed perfect geometric blue star-shape, outlined with red, and enhanced by twelve diamond shapes, one on each of its edges, *fig.9*. From then on, there begins dissection of scintillation. It is a hexagonal star, composed of multi-dimensional facets of wedge, lozenge, triangles, fan and rectilinear shapes, tipped yellow, *fig.10*. Encircling it is another agglomeration of the above mentioned shapes

that formulate a perfect dodecagonal star-shape with blue tips at its edges, *fig.11*. If continued further, there would be other rounds of six and twelve pointed alternate star formations because the symmetrical divisions are continued to the edges of the arches forming the *īwān* of the sanctuary. This is a geometric representation of scintillation of the celestial body, labelled as a star. The shapes and their divisions are so complex that only an expert geometrician can delineate such ordered formations of stars. Moreover, the most amazing part is that they rhythmically convert, from one round to another, into twelve and six points, devoid of any minute disturbance in the equilibrium of the perfect star shapes, both in the representation of six or twelve points.

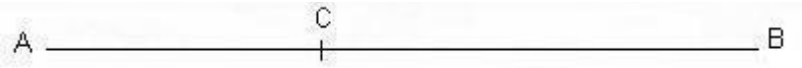
Fig. 11 - Outer most formation of Twelve-Pointed star on the northern Īwān of the Sanctuary of Wazīr Khān Mosque (Photo by the Author).

The surface of the ceiling is opaque and the iconography of scintillation is three-dimensional without deep carving, still shimmer of scintillation is successfully delineated in the design. But the point that astonishes researchers is the presence of symmetry and balance, even when the stars are composed of a cluster of disparate shapes of a variety of sizes. There must be some underlying structure that plays a two-fold function; of division as well as unification. Though, beauty of any structure is enhanced by complicated simplicity. Simple balance stabilises a structure but lacks attractiveness. Therefore, beauty of these complex designs lies, not in naive balance, but in their complicated rhythms. It is nature's symmetry that appears at a glance as asymmetrical, but mobile structures cannot survive with asymmetry. Actually, the chaos of the world has an underlying order, says Volkenstein (296)[12].

The universe is ordered and so are ornamental designs in the Muslim art, even when these are ramified into multifarious configurations. There is unified underlying order within inner and outer structures of the cosmos, holds Critchlow, and the aim of "spiritual disciplines" are to maintain unity between the disparate realities with symmetry and balance (57). It is not naive balance but complicated and intricate balance, analogous is the complex symmetry of the designs under discussion, substrate of which lies in the Golden Ratio. Golden Means or Golden Ratio is the building block of nature, called God's finger prints, or God's sequence because it is maintained in the underlying structures of every object of nature. It has elegant complexity along with simultaneous lovely simplicity which is the cause of its elegance.

"The smaller to the larger is larger to the whole" is the simplest statement that defines Golden Ratio. It bears symmetry even in its statement. Easiest way to define Golden Ratio through a line is to cut the line at such a point that proportion between its smaller and larger segments, equals the proportion between the larger segment and the entire length of the line. It is also called extremes and means ratio, defined as follows:

[12] https://link.springer.com/book/10.1007/978-3-642-78788-1 browsed in June, 15th 2020



AC: CB = CB: AB

Even the statement about proportions of smaller and larger segments bears symmetry.

It is an amazing ratio which is present in every object of nature, such as in the proportions of various parts of human body, in the spirals of the seed-heads of sunflower, spirals of pine cones, spiral of the nautilus, waves of ocean, shape of galaxies, motion of planets, spirals of pineapple, egg also follows the same ratio, and even in the growth of leaves, etc. The ratio can be mathematically defined as, 1:1.618, also analogous to the Fibonacci sequence[13] of numbers.

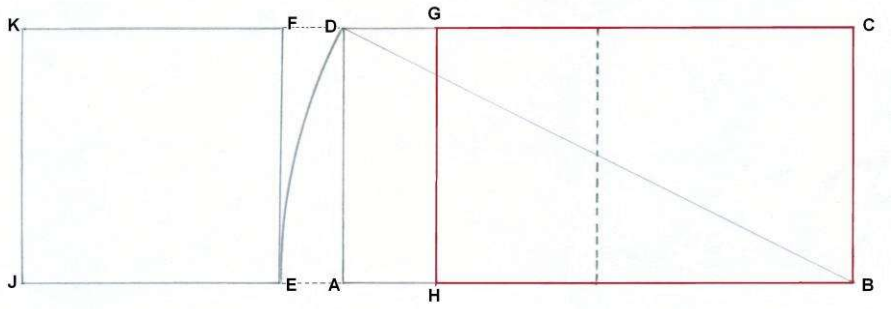


Fig. 12 - Formation of Golden Rectangle (Diagram by the Author).

In the Fibonacci sequence, each forthcoming number is the sum total of the preceding two numbers. Though, apparently this sequence seems to be odd, and appears to be based on random arrangements, but it is extremely organised on the symmetry that is simultaneously simple and complicated. Fibonacci sequence is defined below:

0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, 987 . . . . . .
. . . . . .

[13] Fibonacci sequence was formulated by Leonardo Pisano, nick named Fibonacci, a 13th century Italian Mathematician. He defined it in a tremendous treatise on Arithmetic, titled *Liber Abaci* , wrote in 1202, since then it is considered as one of the best books on Arithmetic. He lived in the Medieval Era, when progress was halted by church, still his intelligence was considered beyond question. King Frederick-II, in 1225 held an open competition on Mathematics to judge abilities of Fibonacci. It is said that he did not only won competition but there was not even a single question that remained unanswered by him (Khan 243)

It is also based on extreme and mean's ratio that causes harmonious divisions and subdivisions of scintillation in the shape of complicated star design. It can be viewed in the construction of Golden Rectangle and Golden Triangle, and their subdivisions that also create smaller divisions of these shapes, but all in accordance to the Golden Proportions.

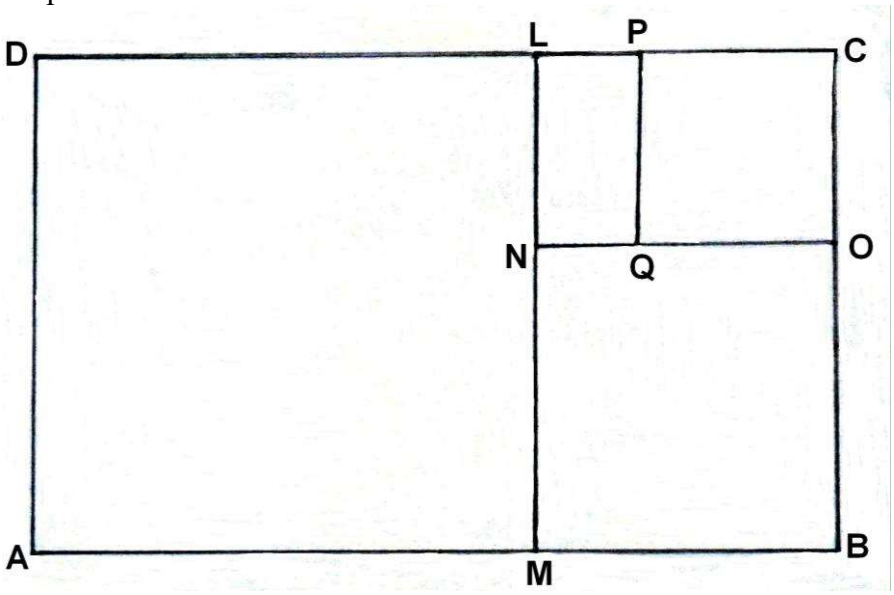


Fig.13 - Formation of Diminishing Golden Rectangles from a Larger Golden Rectangle (Diagram by the Author).

Taking into account the construction of a Golden rectangle with the help of two adjacent squares of equal dimensions, that creates the rectangle ABCD. An arc is drawn from the point D to E, by taking the diagonal BD as its radius. If the line BC equals to 1, the line BE will be equalled to √5. Another square of equal dimensions to the previous ones is attached from the point E, forming a rectangle BCKJ, resulting in √5 +1. This rectangle is then cut into two equal halves, which gives √5 +1/2 that is an exact equal of 1.618. Thus the ratio of the rectangle BCGH is 1: 1.618[14] that constitutes a Golden rectangle, *fig.12*.

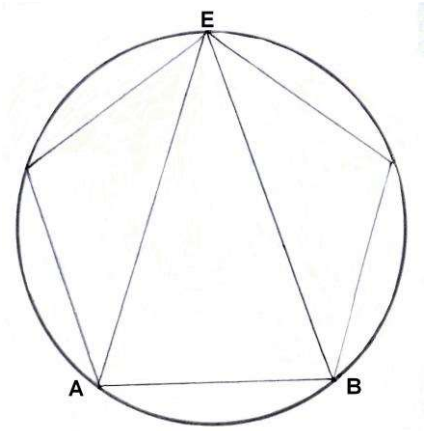


Fig. 14 - Golden Triangle ABE within a Regular Pentagon
(Diagram by the Author).

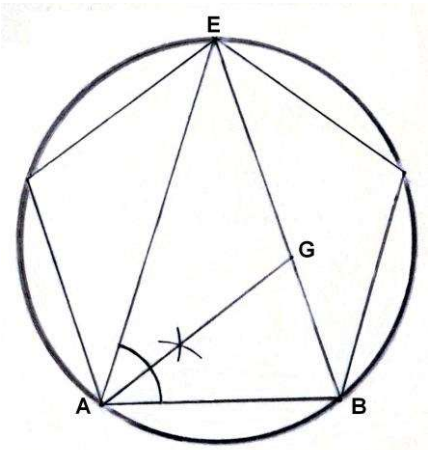


Fig. 15 - Diminished Golden Triangle AGB, within the Larger Golden Triangle AEB (Diagram by the Author).

Drawing of the harmonic segments from the Golden Rectangle, a little more concentration on geometry is required to understand the procedure, *fig.13.*Take a Golden Rectangle ABCD, and draw a square ADLM in it, the remaining rectangle BCLM will also be in the Golden proportions. Drawing another square from the rectangle BCLM will provide another smaller rectangle CLNO. CLNO will also be a rectangle having Golden Proportions; division of it into another square, the remaining rectangle LNQP will again result into another further smaller Golden Rectangle. If the procedure is continued, it will give infinite squares and Golden Rectangles of diminishing proportions [15] . Segments of the scintillations, mentioned above, depend on the same procedure, and lozenge shapes are also devised analogously. It can be further elaborated through the construction and divisions of golden triangles.

[15] G:\ pytha\a museum dedicated to the concept of harmony and the golden section. mht (25.5.08) 7.30 a.m.

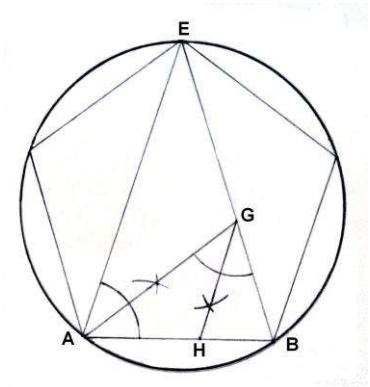


Fig. 16 - Subdivisions of the Golden Triangle leads to diminished Golden Triangles (Diagram by the Author).

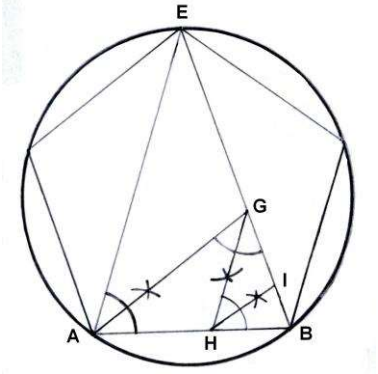


Fig. 17 - Divisions and Subdivisions of Golden Triangles (Diagram by the Author).

A regular pentagon is a marvellous structure of geometry that has the capacity to create some astonishing designs, used widely in the Islamic architectonic decorations. Another wonderful formation is of Golden Triangle constituted by taking one side of the regular pentagon as its base. Join both sides of it at vertex of the pentagon, *fig.14*. In this way the two base angles of the triangle will be of 72 degrees each, with the vertex angle measuring 36 degrees. It will constitute a triangle ABE, which will be having Golden Proportions. It can also be further divided into regular triangles of infinite order. Bisect the angle A of this triangle into equal halves, cutting the line BE at the point G. The division of this line will retain the means and extremes ratio. It will form another Golden Triangle ABG, *fig. 15*. The bisection of the angle G will repeat the same process. It will cut line AB at H and create another triangle GHB, of Divine Proportions, *fig.16*. Bisection of angle H will create a further tiny Golden Triangle HIB, *fig.17,* and bisection of it will produce another diminutive but regular Golden Triangle[16]. Similarly an infinite voyage of Golden Triangles can be disclosed through this path. Therefore, beauty of scintillation is in its multifarious facets and symmetry is in the undercurrents of golden ratio.

[16] G:\ pytha\a museum dedicated to the concept of harmony and the golden section.mht (25.5.08) 7.30 a.m

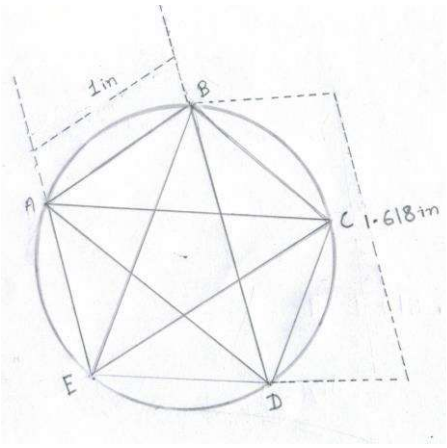


Fig. 18 - Pentagon, the Perfect Golden Star (Diagram by the Author).

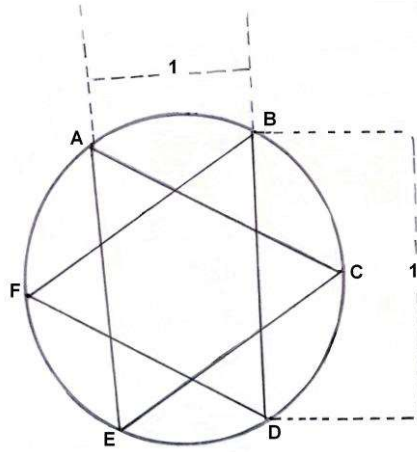


Fig. 19 - Six-Pointed Star, An approximation of Golden Ratio (Diagram by the Author).

Among the star shapes a regular five pointed star known as pentacle carries the precise Golden Proportions. The ratio between an arm and the edge length of a regular pentacle retains Golden Symmetry that is the symmetry of 1:1.618. In simple words if five points of a star of equal dimensions are marked with the letters, ABCDE, as ascribed in the diagram, *fig.18*, with the length of line AB = 1 inch, the length of the line BD will always be1.618 inch or √5+1/2. This means a five pointed star is a true symbol of Golden Ratio. This is perhaps the very reason that it has been in use from the ancient times. This symbol has been considered as a divine shape, retaining magical powers by many cultures. Whereas six-pointed star is an approximation of the Golden Ratio, *fig.19*.

An amazing astronomical fact is related to the planet Venus. Astronomers have been observing from the times immemorial, the path of the planet Venus on the sky that forms a pentacle in its movement of eight years[17]. It has surprised people from the very

[17] https://earthsky.org/astronomy-essentials/five-petals-of-venus

beginning and many ancient civilisations took Venus as their goddess. The goddess of love and beauty of the Romans was Venus, Zahra of Arabs and Aphrodite of Greeks is also the same planet. Amazingly it was considered the goddess of love and beauty perhaps because of the harmony of Golden Ratio within a pentacle, which is a criterion of beauty. Muslims realising beauty in harmony which is a distinguished characteristic of their artwork, used it abundantly for decorative purposes especially to adorn their religious edifices.

In the Muslim gnosis the concepts of equilibrium have no quantitative measure because equilibrium of the corporeal beings is considered analogous to the divine equity. It is viewed as a balance between light and darkness that corresponds between "earthly esoteric hierarchy and celestial angelic hierarchy." Here light is associated with the upper heaven that is celestial spheres and darkness with earthy world that is corporeality, and equilibrium between the two worlds is considered as the cause of creation. Corbin asserts further; "the visible aspect of a being presupposes its equilibration by an invisible and celestial counterpart; the apparent and exoteric (zāhir) is equilibrated by the occult and esoteric (bātin)" (Corbin 57). Equilibrium between a star and its illumination brings into being the elegant stellar designs of Islamic Art.

Thereby, scintillation provided reverential status to star ornamentation, for having esoteric links with the Supreme Reality, in both pagan and revealed religions. Muslim artists organized its shapes on the basis of nature's building block. They did not concentrate on the apparent shapes, rather directed their vision to the underlying structures of the objects they represented as art forms. By ignoring the principals of mimesis, they were following Aristotelian vision. For Aristotle "---- the aim of art is to represent not the outward appearance of things, but their inward significance" (Will Durant, 59). Therefore Muslim artists were not naïve observers of nature but their erudition scrutinised undertones of phenomenon that is noumenon. It is the very cause of shaping complicated stellar designs, while maintaining equilibrium of a perfect star-shape.

The erudition to explore noumenon requires inner vision and the route to attain it is explicated by al-Ghazāli and then by Kant in later times, on analogous terms. Both enlist it as perception, sensation and knowledge. The first rung of the ladder is perception that stirs

rational feeling; aesthetic or scientific. Rationality about the perceived object widens horizons of thought, arousing sensation to search for veracity of the perceived experience. It deciphers deeper realities, not limited to apparent facts that is phenomenon but unravels undertones of reality that is noumenon, if the quest of a searcher is equitable. The Muslim theosophists mark this path as *hissi*, *qalbi* and *nafsi*, previously defined as perception, sensation and knowledge. *Hissi* is the sensory perception, taken as ultimate truth by the plebeians. They are not conscious about limitations of the human sight, and incapacitated to perceive beyond the exoteric, while al- Ghazāli focuses the esoteric.

Elevated status is that of *Qalbi*, because *Qlab*[18] in Arabic is a combination of mind and soul, so perception is mingled here with sensation. What is perceived by the eye is registered by the human soul. It creates a bridge between physical and metaphysical realities. As soul has metaphysical existence, while mind registers the functions of perception and of the inner vision. It bridges links between perceptible realities and the visions of the soul that is physical and metaphysical realities. Thus, *Qalbi* is a step higher than *hissi*. The discussion deciphers another essential fact that higher truths do not show through vacuums, rather a "physical object" is required to perceive an "aesthetic object".

The first phase was the consciousness about phenomenon and its causal nexus; relations between its cause and effect. While, the second phase is analytical, where collected data is analysed by inciting doubts and uncertainties, for, the metaphysical realms exist beyond any causal nexus. It is to attain certitude about perceived facts. Al- Ghazāli explicates this path in *al-Muqīdh:*

> The search after truth being the aim which I propose to myself, I ought in the first place to ascertain what the bases of certitude are. In the second phase I ought to recognize that certitude is the clear and complete knowledge of things such knowledge that leaves no room for doubt, nor any possibility of error (Sheikh, Sharif ed. 588).

[18] Qalb is and Arabic word, means heart

Through the above mentioned path configuration of Muslim architectural ornamentation took place, especially the intricate stellar designs. These were shaped for their scintillation, enhanced through dissection of its facets but harmonised through Golden Ratio. In the Great Soviet Encyclopaedia, the concept of harmony is defined in the following words:

> *Harmony is coordination of the parts and the whole, coalescence of different components of the object in the unified organic whole. In the harmony the internal orderliness and measure of the being get the external revelations*[19]

This definition of harmony reflects the substrate of Islamic architectonic ornamentation that is extremely complicated but highly attractive too. The entire process of its aesthetics is three-folds that begins with perception of the physical, by passing through the analytical sieves; it deciphers undercurrents of realities, and evolves novel forms of perfection, harmony and beauty. It is best reflected in the intricate stellar motifs; the shapes, under the sway of geometry are first dissected and then united to define scintillation as main source of converting the round and elliptical bodies into luminous and shimmering ones. It actually defines the role of light on celestial bodies in motion that causes their scintillation. The sanctity of light for being associated with the divine realms configures ornamentation of religious edifices of the Muslim World.

[19] G:\ pytha\a museum dedicated to the concept of harmony and the golden section.mht (25.5.08) 7.30 a.m.

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Obituary