

Standards of Classical Architecture Criticism: Between Mathematics and Philosophy

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Abstract: Criticism is an intellectual process that primarily searches for beauty aspects in the works of art, including architecture. This article explores the mathematical and philosophical principles of classical architectural criticism. It is hypothesized that design criteria during the Classic period were clear and specific. The research presents theories of classical art that focus on the process of beauty interpretation. It also assesses the mathematical evaluation of architectural art and beauty through “The Golden Ratio” and “The “Fibonacci Sequence.” Classical philosophy, and its perception of beauty, is discussed as an essential basis in any artistic critical activity. The research asserts that the science of aesthetics is both objective and subjective, which explains the difference in aesthetic evaluation across eras. Objectivity stems from conditions of proportionality that must be met for an architectural art to be aesthetically judged as beautiful. Subjectivity lies in the time and place of the architectural work, whereby tendencies, tastes, and needs related to the human and geographical environment can affect the standards of beauty. This makes the evaluation of beauty in classical architecture a delicate and complex process in which many aspects must be considered to have an objective, fair, and correct judgment.

Keywords: Beauty; Aesthetics; The Golden Ratio; Fibonacci sequence; Theory of imitation; Judgement of Taste; Absolute idealism

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1 Introduction

Architecture criticism generally refers to the critical assessment of art and literature in the Classical period of art history. The Classical period falls between the fifth century BC and the beginning of the Middle Ages, which was characterized by the dominance of both Greek and Roman arts. It also encompasses the period from the late Middle Ages to the seventeenth century (a.k.a. the Renaissance), in addition to the Neoclassical era between 1770-1830 CE.

What makes Classicism distinctive is its long-term prevalence and its consideration as one of the most inherent and treasured schools in the history of art. Classicism represented dignity, prestige, and a high respect for values and standards, which drove many monarchs in different countries around the world and throughout history to employ it as their official architectural style. For instance, it was adopted by Napoleon during his rule of France, Stalin in the former Soviet Union, Hitler in Germany, and Mussolini in Italy. Then again in the second half of the twentieth century and under the name of ‘Postmodern Architecture’ – driven by nostalgia for the originality of the past – classical architecture re-emerged through many of its terms and elements.

This research explores the standards of “Classical Architecture Criticism” and their role in preserving the Classical period for a long time. Moreover, it highlights the reasons behind people’s attachment and nostalgia to this form of architecture. The article also examines the reasons that lie behind considering some classical buildings as memorable architectural icons. It is hypothesized that the design criteria during the Classical period were clear and specific. On one hand, it considered the laws of the universe and creation by

imitating the proportions in nature and humankind. On the other hand, it reflected concepts and ideas of the hosting cultures and nations. These criteria were set and defined by philosophers, who were the prominent reference for people at that time as they provided insights, ideas, and explanations on all aspects of life. Artists, including architects, used to design while abiding by specific rules and regulations and avoiding any personal inclinations or whims. Moreover, their works of art were subject to criticism which was strongly characterized for being always present and effective throughout the Classical period. This controlled architectural production and often amended its course. As such, the research will trace design criteria in various eras where classical art was prevalent to understand the logic behind them and their basis of origin.

It is worth mentioning that the movement of criticism in classic architecture was highly associated with “beauty.” Criticism was an intellectual process that primarily examined the aspects of beauty in the works of art, including architecture. Hence, the criteria of classical art criticism were not different from those of beauty. Since evaluating beauty was generally based on mathematical concepts and philosophical theories produced by classical philosophical schools throughout ages, aesthetic judgments were applied to architectural works based on these concepts and theories. Thus, we will successively review the most significant ideas and theories of classical art, focusing on the process of interpreting beauty and defining its criticism criteria.

2 Beauty and Mathematics

“Without mathematics there is no art.” Luca Pacioli (1509)^[1]

Historically, architecture has been part of mathematical interests. The most prominent architects of antiquity were at the same time mathematicians and vice versa. The most distinctive historical buildings (pyramids, temples, churches, ...) were designed by mathematicians^[2]. Pythagoras is considered the first mathematician to have had a major influence on architecture. He considered beauty to be related to order, so he established an aesthetic theory based on proportion and symmetry. Symmetry here is derived from the Latin word *symmetria*, which means the repetition of shapes and proportions in a building from the smallest part to the entire structure^[3]. In other words, the parts of the building must be in

their proper position and linked in clear, harmonious, and proportional relationships with each other. Plato, and later Aristotle, were influenced by the ideas of Pythagoras, as they considered that harmonious proportions, which are often based on mathematical equations, are an indication of beauty.

To achieve proportion, many mathematical principles had been set; perhaps the most famous ones which were related to architecture are: The Golden ratio and the Fibonacci Sequence.

2.1 The Golden Ratio

The first man, with his innate sense, recognized the beauty around him and felt a great comfort and pleasure contemplating the beauty of the universe. He began to sense beauty without knowing its secret. Accordingly, he searched and researched beauty through mathematics and philosophy until he discovered its secrets. Perhaps the most important of these is proportion, which is considered one of the greatest beauty secrets. The Greek scientist Euclid, who was born in the year 300 BC, was the first to develop a recorded and documented mathematical equation to understand and explain the proportions of beauty in nature, which he called “Extreme and Mean Ratio.”

It is very important to clarify that this ratio was not set by Euclid, but rather was always present in the entire universe in humans, animals, plants, and different aspects of nature. It was even adopted by ancient civilizations, including the Pharaonic ones, to build the pyramids. Recent studies have shown that The Great Pyramid of Khufu was built according to the golden ratio (Figure 1)^[4]. So basically, discovering the equation that produces this ratio was what Euclid did.



Figure 1. The Great Pyramid of Khufu^[48]

The first Greek scientist who spoke about

what was later known as the golden ratio was the mathematician Pythagoras (570-495 BC), whose study of the standards of beauty and the proportions in the natural world led to what is known as the “Golden Rectangle,” which was adopted in Ancient Greek architecture. One famous example is the Parthenon – Acropolis of Athens (Figure 2).

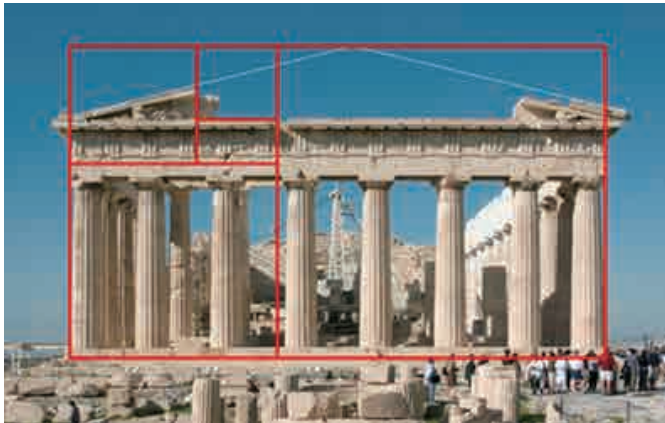


Figure 2. The Pantheon and the golden rectangle [49]

Pythagoras also talked about other geometric shapes associated with golden ratio including the regular pentagon (a five-sided geometric shape contained in a circle and its sides and angles are all equal) (Figure 3), the pentagram (which was the Pythagoreans’ symbol, and later for the philosophers of the Middle Ages and the Renaissance) (Figure 4), and the regular ten-sided polygon [5].

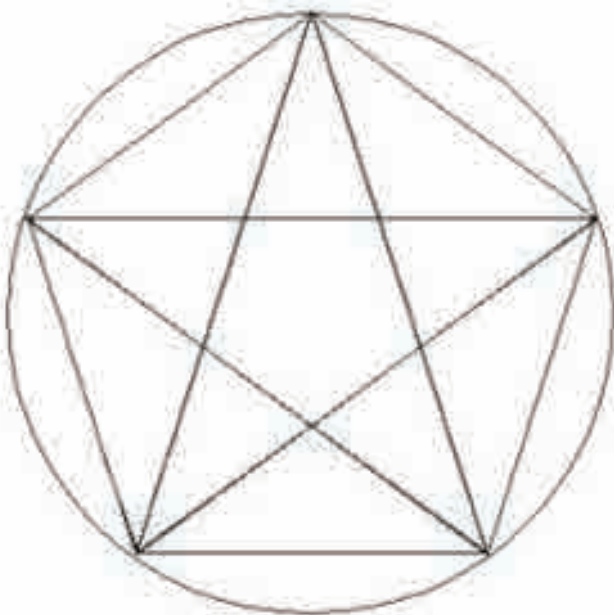


Figure 3. The regular pentagon [50]

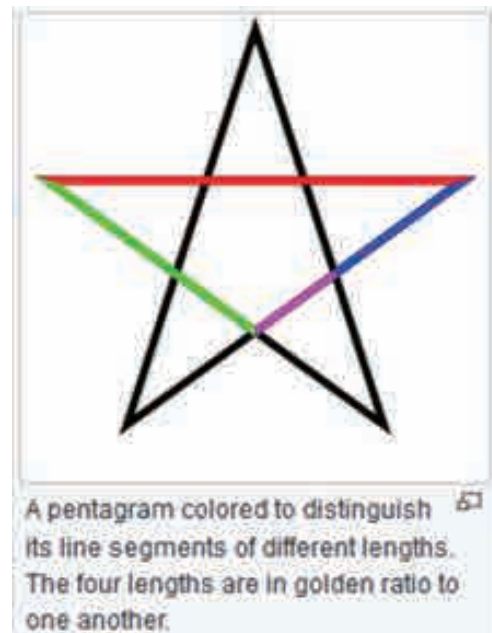


Figure 4. The pentagram [51]

In his book “Timaeus”, written around 350 B.C., Plato (427-347 BC) had described the regular solids which were later known as Platonic solids (the Cube Dodecahedron, Icosahedron, Regular Octahedron, and Regular Pyramid Tetrahedron) (Figure 5). Later, research showed that these solids are related to the golden ratio (Figure 6) [6].

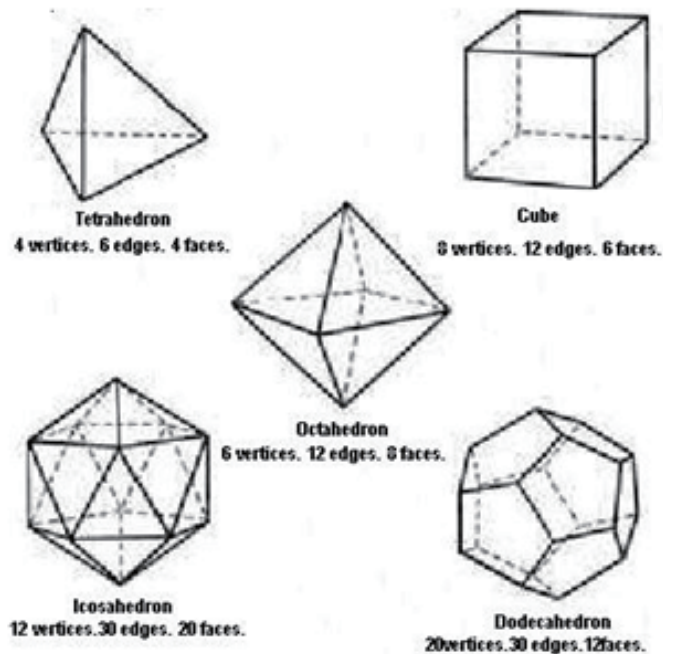


Figure 5. The Platonic solids [52]

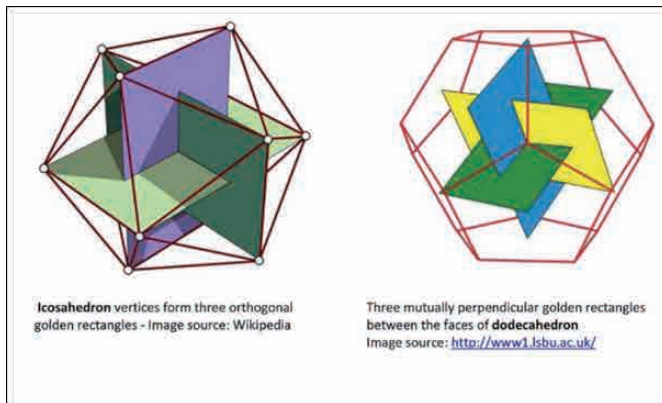


Figure 6. Platonic solids and the golden ratio^[53]

The first documented definition of what is known today as the “golden ratio” belongs to Euclid (325-265 BC), in his famous book "Elements", where he said: “The line AB is divided by the point C according to ‘extreme and mean ratio’ when the ratio of AB over AC (the greater part of the line) equals the ratio of AC over CB (the smaller section of the line) (Figure 7) [7].”

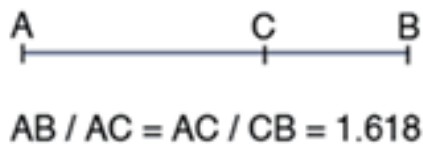


Figure 7. The Golden Ratio

The Greeks found that this ratio is visually soothing, as it achieves a distinct balance and special charm, and it generates spiritual joy, psychological comfort, and automatic attraction to the work of art, so they applied it in their architecture. The application of this ratio had not been confined to merely straight lines, but expanded to include many other forms mainly in two-dimensional shapes (the golden rectangle and the golden triangle) as well as in the three-dimensional shapes (the regular pyramid, pentagram, ...).

With time, this ratio preserved its charm and attractiveness. The Romans had taken it from the Greeks (Figure 8), and Vitruvius in his treatise “De Architectura” (27 BC) provided detailed explanations of it. Muslims who were introduced to this ratio used it in their architecture as well. One of the most impressive examples is the Great Mosque of Kairouan in Tunis, and the Taj Mahal in India (Figures 9 and 10). It also came back and appeared strongly in the thirteenth century following the discovery of the Fibonacci sequence.



Figure 8. Proportions of its major elements are clearly those of the golden rectangle, favored by Roman architects^[54]



Figure 9. The Great Mosque of Kairouan in Tunis^[55]

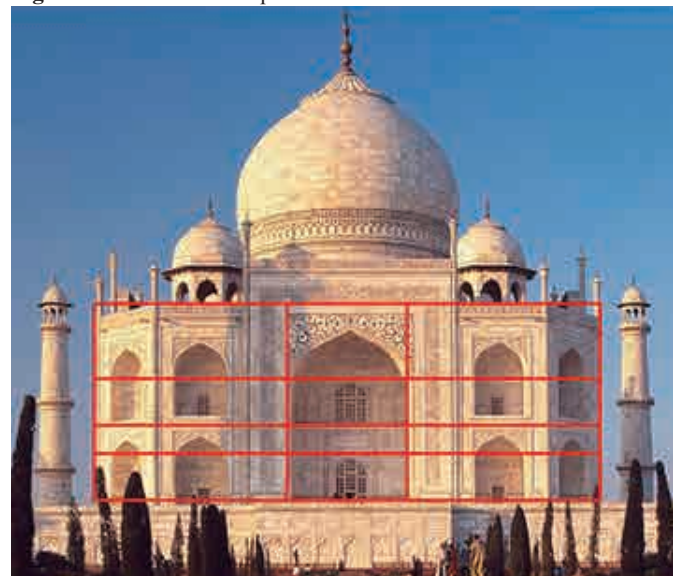


Figure 10. The Taj Mahal in India^[56]

2.2 The Golden Ratio and the Fibonacci Sequence

As awareness to surroundings increased, humans began to realize that beauty in nature is not random, but rather follows well-studied and balanced systems and rules. The Italian mathematician Leonardo of Pisa, known as Fibonacci, who lived in the thirteenth century (1170-1250 AD), discussed in his book “Liber Abaci” (1202) a numerical sequence he observed while studying the breeding of rabbits. This was later named “the Fibonacci sequence” by the French scientist Edward Lux (1842-1891). Nevertheless, this sequence was previously known by ancient Indians as they applied it to the science of weights of poetry ^[8]. This sequence begins with zero, then one, and ascending numbers whose value is a result of the sum of the two previous numbers. To illustrate: one plus one equals two, two plus one equals three, three plus two equals five, five plus three equals eight, and so on to infinity (example: 0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144...) ^[9].

Johannes Kepler (1571-1630), a mathematician, noticed later that one of the advantages of this sequence is that if you divide any number by the number before it, you gradually get closer to the ‘extreme and mean ratio’ described by Euclid (specifically, starting from verse 5), since this sequence is practically an application of Euclid’s equation ^[10]. In other words, the Euclid equation, can be applied to any two consecutive numbers “a” and “b” from the Fibonacci sequence with “a” being the largest number. He explained this in a letter he wrote in 1608 indicating an approximate value for the golden ratio of 1.6180340.

$$(a+b)/a = a/b = 1.6180340$$

Later studies showed that this sequence is largely present in nature. For example, in the botanical world, the number of petals in a flower corresponds to the numbers of Fibonacci (1, 3, 5, 8, or 34). Also, if we look at the bottom of the pinecone, we often see lines that have spirals with two directions. If we count the first direction, we see that its value corresponds to one of the Fibonacci numbers (for example: 13), but if we count in the other direction, we find the Fibonacci number being so close to the previous in

the series (for example: 8) (Figure 11). The same applies to the seeds in the sunflower, as we find two sets of spiral lines arranged in two directions. If we count these lines, we will find that its value clockwise is 34 and in the opposite direction, it is 21. These are also Fibonacci numbers (Figure 12) ^[11].

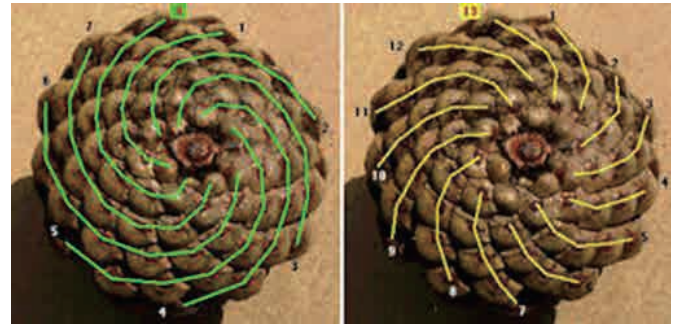


Figure 11. The pinecone spirals as a natural illustration of the Fibonacci sequence: clockwise=8; counterclockwise=13 ^[57]

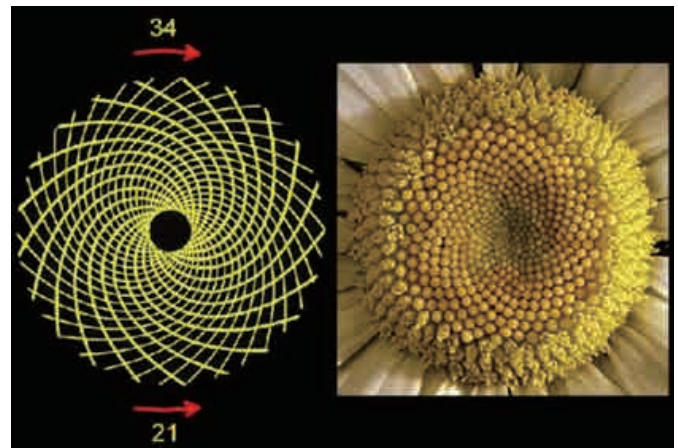


Figure 12. The spirals in the sunflower follow the Fibonacci sequence. clockwise=34; counterclockwise=21 ^[58]

Starting from this point, scientists tried –through the link between the golden ratio and the Fibonacci sequence – to explain the rules of beauty in the universe and then determine the proportions that produce beauty. This led to the Fibonacci rectangle, which consists of adjacent squares where the sides are successive numbers from the Fibonacci sequence, and the Fibonacci spiral, which is created by tracing arcs that connect the corners of squares in a Fibonacci rectangle ^[12] (Figure 13). This spiral is found in many aspects of nature, such as the spiral shape of shells, the bends of sea waves, and some shapes of galaxies... etc. (Figure 14).

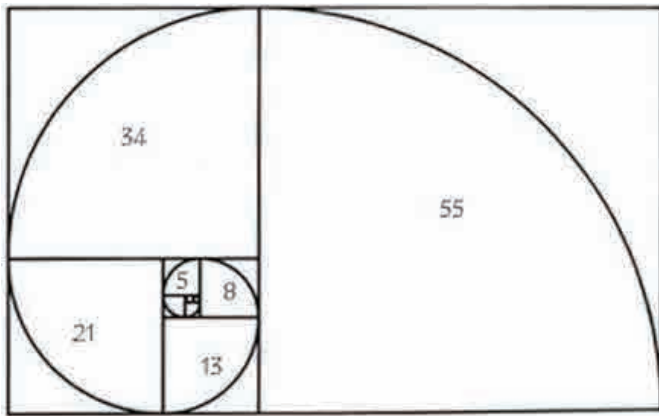


Figure 13. Fibonacci spiral inscribed in a Fibonacci rectangle^[59]



Figure 14. The golden spiral in nature.^[60]

In the sixteenth century, the Italian mathematician Luca Pacioli (1445-1517), known as the “monk drunk on beauty,” delved into the study of ‘extreme and mean ratio,’ where he called it ‘The Divine Ratio’ in his published book in 1509^[1]. The pictures of this book were drawn by Leonardo da Vinci, who, like him, was a researcher of beauty and fond of this proportion (Figure 15). Da Vinci used the extreme and mean ratio in many of his works, as did other artists such as Angelo, Rembrandt, Raphael, Georges Seurat and others. Furthermore, this ratio prevailed during the Renaissance, especially in the works of Palladio (1508-1580) (Figure 16), as this ratio was essential for creating balance and beauty in the artistic and architectural works of that time.

In 1835, Martin Ohm launched the term ‘Golden Ratio’ for what was known as the divine ratio or proportion. At the beginning of the twentieth century, specifically in 1900, Mark Barr suggested that the golden ratio be symbolized by the Greek letter “phi.” It was also named in honor of the Greek architect and sculptor Phidias (480 BC, - 430 BC) who often used this ratio in most of his works, especially in the

design of the Parthenon sculptures^[13]. From that time on, the common definition of the golden ratio became a visual representation of the symbol Phi (ϕ), whose value is approximately 1.618.

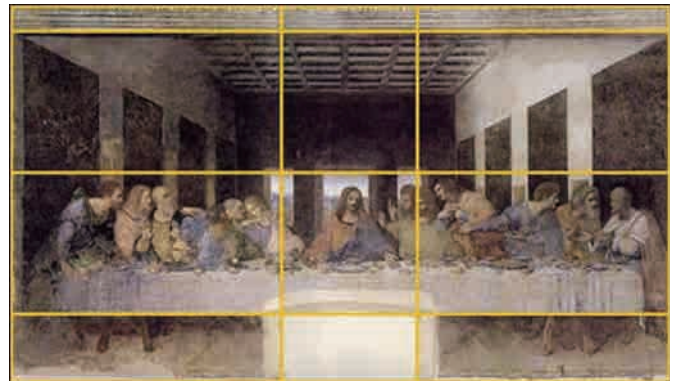


Figure 15. The use of golden sections in the Last Supper painting of Leonardo da Vinci^[61]



Figure 16. Villa La Rotanda designed by Andrea Palladio^[62]

Since then, the use of the golden ratio expanded. So in addition to the golden rectangle (the ratio of its length to its width equals the golden number Phi 1.618), there is the golden triangle (which is an equilateral triangle and the ratio of the length of the large side to the small side i.e. the base side equals the golden number Phi 1.618) and the golden pyramid (a pyramid that has a square base and can be defined by its right-angled triangle in the middle) (Figure 17), in addition to many golden geometric shapes that can be formed through the use of golden section ratios such as the circles, ellipses, pentagrams, and spirals^[14].

The golden ratio, which is simply 1 to 1.618, can also be adopted in all design fields (Figure 18). In architecture, for example, it can be used in the design of windows and doors, especially in the portico, in dividing the facades, or in determining the width or length of decorative elements. It can also be adopted when the design is composed of several elements of

the same type, for example, a group of rectangles of different size and area. In this case, to achieve the golden ratio, it is sufficient that the ratios of the dimensions of these rectangles are equal to the golden number i.e. 1.618. The same goes for triangles, circles, and squares.

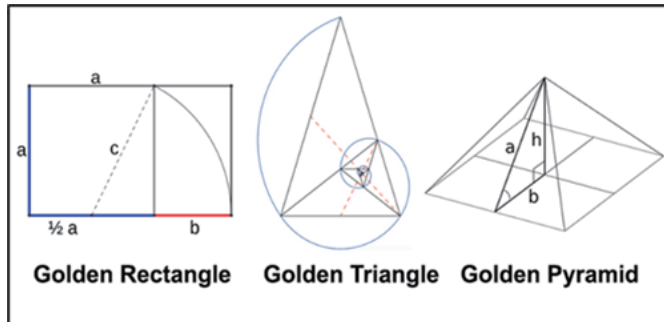


Figure 17. Use of the golden ratio in the golden rectangle, the golden triangle, and the golden pyramid^[63]

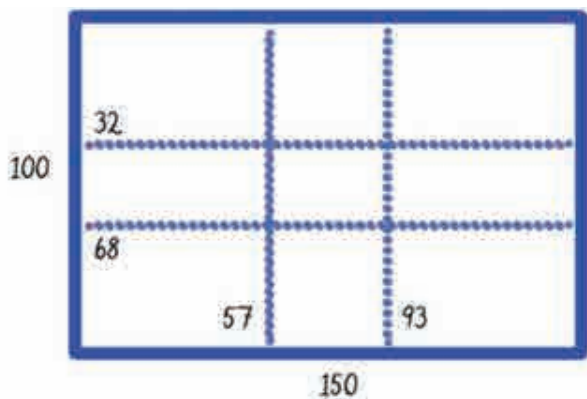


Figure 18. The golden ratio is 1 to 1.618

Throughout ages, the golden ratio has preserved its charm and attractiveness and has been the subject of research and exploration by many biologists and anatomists who have shown that the human body is governed by the golden ratio (Figure 19).

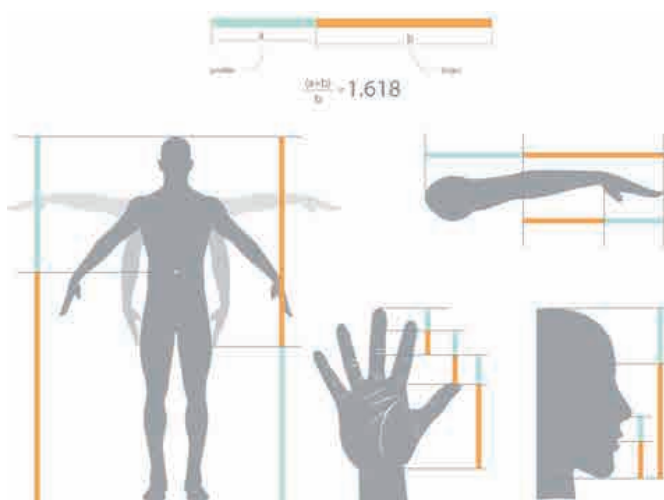


Figure 19. Implementation of the golden ratio on human anatomy^[64]

It has also preserved its presence in many important and timeless classical architectural works in addition to modern works. The architects Le Corbusier and Mario Botta were famous for adopting this ratio in many of their buildings (Figures 20 and 21).

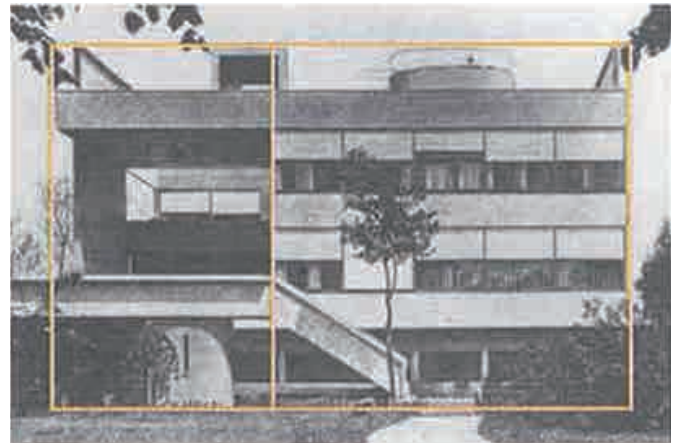


Figure 20. The golden ratio in the villa Garche designed by Le Corbusier.^[65]



Figure 21. Mario Botta's house in Origgio^[66].

To this day, this ratio is still used in many contemporary architectural designs, most notably the United Nations Building. The ratio of the building's width to height for every ten floors is equal to the golden ratio (Figures 22 and 23). In addition, this ratio was adopted in sculptures, paintings, photography (it should be noted that the most important photographic techniques adopted by professionals are the use of The Phi Grid and the Fibonacci Spiral), graphic design, and various types of designs.

In short, it can be said that the golden ratio can be applied and used in all areas of design, as many important companies and commercial and industrial establishments in our world today adopt the golden ratio in designing their logos and advertisements^[15] (Figure 24). We believe that the golden ratio constituted the highest standards of beauty for classical art due to

the proportion and balance it achieves, which are the basis of classic design. Thus, the golden ratio and the Fibonacci sequence are among the basic principles that have contributed to directing and evaluating classic architectural works since ancient times and up to this day.



Figure 22. CN Tower in Toronto.^[67]



Figure 23. The golden ratio in the UN Building.^[68]

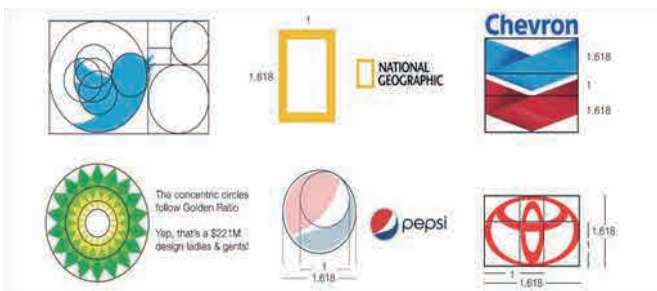


Figure 24. The golden ratio in logos and advertisements^[69]

3 Beauty and Philosophy

We mentioned previously that perceiving and enjoying beauty is an innate experience for humans. However, thinking about it philosophically by analyzing and explaining its manifestations and defining its criteria came into existence with ancient Greek philosophy.

Firstly, it is worth noting that philosophy in the ancient times - especially in the classical period - was considered the mother of all sciences. Philosophical ideas and theories used to reflect the people's culture and social events. Therefore, the perception of beauty changed as human thought developed and life progressed through discoveries and complexity. For this reason, we will trace the perception of beauty and define its standards in parallel with the historical development of civilizations and peoples.

Philosophers did not come to a common agreement about the essence of beauty, specifically about what is beautiful and the conditions that must be met in things in order to consider them beautiful, and whether it is necessary for the beautiful to be useful or good. As such, we will later review the most significant theories of classical philosophers related to beauty, and the criteria that they set to achieve successful works of art and architecture.

3.1 The Standards of Beauty of Greek Philosophy

Socrates (469-399 BC) linked beauty to utility. Beautiful is what brings benefit, advantage, or a higher moral purpose (Matar, 1962). For Socrates, "what is useful for a specific purpose is to be used beautifully for this purpose^[16]." In other words, things are beautiful when they are designed in a way that makes them function better. For example, the protruding eye is more beautiful than the normal eye because exophthalmos increases the widening of the field of vision. Also, the snub nose is more beautiful than a straight nose because it does not obstruct the angle of vision.^[17] For Socrates, whether it is fine arts or industrial arts, it must be devoted to the service of man and directed to the values of goodness, wisdom, and virtue. It is worth noting that the benefit for Socrates is not limited to the material and tangible benefit only, as the psychological pleasure resulting from a sense of beauty is included in the benefit and advantage as well^[18].

As for Plato (427-347 BC), a disciple of Socrates, he considered that the universe consists of two

worlds: the realm of ideals, or spiritual realm, which includes the values of goodness, truth, and beauty, and the physical realm, which comprises evils and sins. Beauty, according to the theory of Utopia, is something divine with an absolute meaning found in the essence of things. It is synonymous with good and beneficial (the good is beautiful). Real or absolute beauty does not exist on earth, but only happens in the world of ideals, and what on earth (the sensible world or the material world) is nothing but an imperfect imitation of true or ideal beauty. Plato says, "The contemplation of beauty causes the soul to grow wings, so it flies high towards the spiritual world where it used to live before it fell down to earth and to which it always yearns to return"^[19]. Plato considers that earthly beauty is a light shade of absolute beauty that exists in the ideal world, and that man had previously experienced it before this earthly life. So, when a person sees beauty on earth, he remembers the mystery of absolute beauty and feels a sense of pleasure and comfort that he previously felt there^[18]. In his opinion, this is the secret of beauty and the secret of the pleasure it creates.

Based on the above, beauty in the arts – including architecture – is achieved for Plato through the imitation of nature (which means a literal imitation without any additions), that is basically an imperfect imitation because it is in turn an imitation of the ideal world. The type of imitation has been defined as an enlightened imitation that includes knowledge and awareness of the origin that it imitates and is linked only to the values of goodness, truth, and beauty, and avoids evil and material desires. Hence, art, according to Plato, is a "copy of a copy", an imitation of the sensible realm, which is in turn an imitation of the ideal world, and this puts art in the third place, for it moves away from the sublime truth by two levels; so to speak, it is the shadow of shadow^[20]. This explains his critical campaign against artists and the reason for expelling them from the republic, maintaining only certain types of poetry for educational purposes^[21].

In addition to linking beauty with moral values such as truth, goodness, and justice, Plato emphasized that beauty exists within a specific order and proportions and in everything that is subject to number and measurement. Therefore, in his opinion, it is important to respect ideal geometric proportions and measures, as similar to Socrates, he opposed the principle of aesthetic pleasure, which is the type

of art that is based on a mere feeling of pleasure or subconscious emotion.

Aristotle (384-322 BC) emphasized the theory of art imitating nature through his 'Theory of Imitation' and connected art to virtuous values. However, unlike Plato, he rejected the separation between the ideal world and the sensible world, and considered that perfect beauty exists in the real or sensible world and not only in the world of higher ideals. He also stressed the importance of art, as it combines the beauty of nature and human effort. Therefore, imitation for him does not mean a literal imitation of nature, but rather an imitation of the essence of truth or an imitation of conformity and form in nature^[22]. Thus, according to Aristotle, imitation is more complete than nature, since art completes what nature does not with the support of the artist's thought.

Aristotle defined the standards of beauty to be order, proportion, and definiteness. For him, things look beautiful when their parts are symmetric or arranged according to a specific order, and when they have an appropriate non-arbitrary size because the extra size leads to confusion in the mind of the recipient. Beauty, according to Aristotle, is only achieved through specific proportion and order. As such, we say that the artistic production in ancient Greece was based mainly on the "Theory of Imitation." The proportions adopted in architecture are an imitation of proportions found in nature. The ancient Greek architects had innately realized this matter, so the Greek architectural orders are closely related to the ideals in the human bodies^[23]. In addition, the symmetry and harmony in ancient classical buildings is simply an imitation of the symmetry of the human body and the harmony of its organs. For example, the Doric imitates the proportions of the body of a warrior, the Corinthian imitates the body of a graceful young girl, and the Ionic fits with the body of a mature woman^[24] (Figure 25).



Figure 25. The Doric, the Corinthian, and the Ionic^[70]

3.2 The Standards of Beauty of Roman Architecture

The best representative of the ancient Roman architectural thought – especially with regard to beauty standards – is Marcus Vitruvius (80-70 BC), who is famous for his book “DE Architectura,” which is considered the oldest written architectural document we received from ancient civilizations. The book includes Vitruvius' theory of architecture in addition to the concepts, principles and proportions that contribute to achieving beautiful architecture.

Vitruvius, like other ancient Greeks, considered that the architectural proportions were inspired by the proportions of the ideal human body. Accordingly, Vitruvius determined the ideal measurements for the human body and the proportions that connect its various organs. In addition, Vitruvius discovered that the ideal human figure could be located within a circle and a square at the same time, so that their center corresponds to the position of the navel and the tips of the fingers of the hands and the feet, touches the perimeter of the circle and the corners of the square. Leonardo da Vinci was impressed by the proportions that Vitruvius set for the human body, and after more than 1400 years, he drew the ideal man described by Vitruvius and he called it “The Vitruvian Man” (Figure 26).

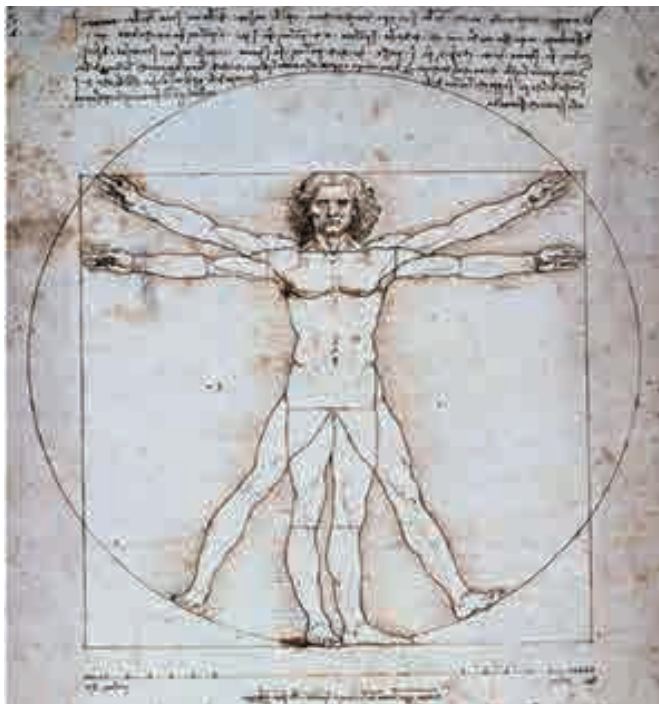


Figure 26. The Vitruvian Man ^[71]

Vitruvius' eternal theory of architecture, which is still adopted and taught today in various academic

institutions, states that good architecture achieves a balance between three principles: utility or function (*utilitas*), firmity (*firmitas*), and beauty (*venustas*).

As for the architectural beauty, in his opinion, it is achieved through arranging the various elements of the architectural work in an orderly, harmonious and proportional manner with each other on the one hand, and with the surrounding on the other hand. This results in achieving balance, integration, combination, and rhythm, leading in the end to attain complete beauty. Furthermore, Vitruvius stresses on the ethical dimension of architecture and the importance of having well-knowledgeable architects in the field of philosophy, by saying: “As for philosophy, it makes an architect high-minded and not self-assuming, but rather renders him courteous, just, and honest without avariciousness. This is very important, for no work can be rightly done without honesty and incorruptibility” (Vitruvius, 1914).

3.3 Beauty in the Medieval Ages

Arts in the Middle Ages – including architecture – reflected the religious values of the Christian faith through their symbolism and idealism. The prevailing beauty standards, which were an extension of Greek and Roman thought, had been altered to become more sublime and harmonious with Christian theology and the teachings of the Church. New artistic forms have emerged that are more compatible with the common taste that seeks tranquility and a spiritual reverence.

Art criticism – including art of architecture – in the Middle Ages, which spanned from the end of Roman civilization to the fourteenth century, was influenced by the theory of goodness and beauty, which considered that the best types of art are in the good and beautiful works. Most of the artworks of this period, whether in the Romanesque, Gothic, or Byzantine era, depicted religious themes that were painted on huge murals in churches and on the ceilings of cathedrals ^[25]. Art criticism during this period was subject to the opinions and authority of the clergy, so images or drawings that express the pleasures of the worldly life were forbidden, as they contradict the Byzantine Church's call to a life of asceticism, austerity, and worship ^[26].

The most prominent philosophers of the time who dealt with the subject of beauty is Thomas Aquinas, a saint, priest, and Italian theological philosopher who lived between 1225-1274 AD. Thomas Aquinas

defined the beautiful as “that pleasing when seen”^[16]. What is beautiful is pleasing for being an object of contemplation, whether through the senses or within the mind itself^[27]. For Thomas Aquinas, beauty is achieved by three things: wholeness or perfection (things that are imperfect are ugly), proportionality or symmetry, and radiance (beautiful things lie in the brightness of colors)^[18].

Perhaps the most noticeable change in architecture during these times is the emergence of Gothic architecture, which originated in France in the twelfth century and quickly spread to most of Europe. Their use was concentrated in religious buildings, especially cathedrals, with the aim of emphasizing their grandeur and prestige through the elements, shapes and methods of construction which allowed them to be higher, luminous, and stronger. The arch and the pointed arch were used, which were inspired by Roman architecture, but they were innovatively implemented (Figures 27 and 28).

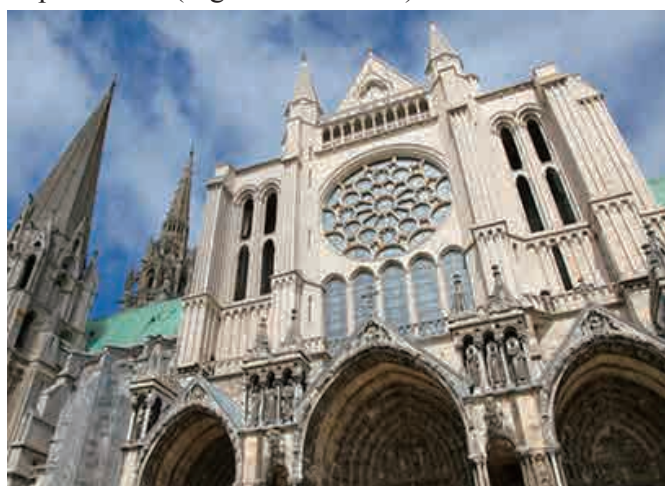


Figure 27. Cathedral Chartres In France.^[72]

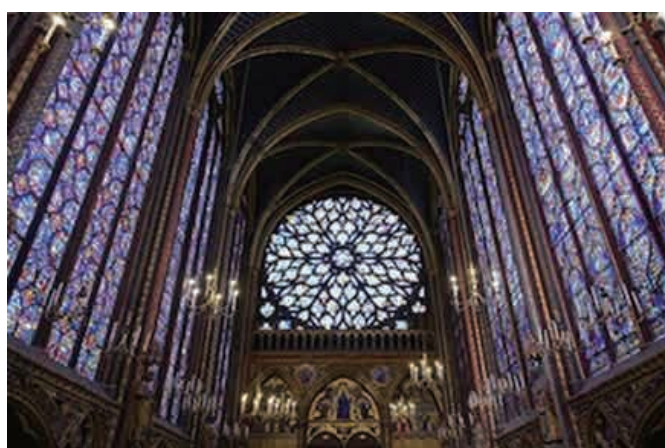


Figure 28. The Roman arch in gothic architecture^[73]

3.4 Principles of Beauty and Criticism in Islam

“Allah is beautiful and He loves beauty” (honorable hadith). Beauty is a value that Islam has called for because of its importance in the transcendence of the human soul. Muslim thinkers and philosophers have worked hard to explain beauty and define its principles. Some of their aesthetic ideas converged with what was mentioned in ancient Greek philosophy, especially the teachings of Plato and Aristotle, while other ideas were different due to their connection with the principles of the Islamic religion. Several Muslim Sufi philosophers dove into understanding beauty and exploring its mysteries and had their theories in this field. We will consecutively review the most important ideas of Muslim philosophers about beauty, which formed the cornerstone for evaluating artworks of all kinds.

The theory of beauty in Islam is mainly related to the idea of belief in Allah and monotheism. The universe and what it holds, the outer and the inner, are all created by Allah, and He created it in its fullest form (“Allah is the Creator of all things” – The Holy Qur’an, Surat Al-Zumar, Verse 62; “Who has made perfect everything He has created” – The Holy Qur’an, Surah Al-Sajdah, Verse 7). The universe, in all its parts and the different worlds in it, follows a system based on accurate proportion and precise connections (“He has created everything, and has ordained for it its proper measure” – The Holy Qur’an, Surat Al-Furqan, Verse 2). So, a defect in one part affects the rest of the parts. Hence, beauty according to Islam results from proportion, harmony, and synchronization. In short, we can say that the standards of beauty in Islam are the same on which the universe was created.

3.4.1 Beauty and Perfection

According to Abu Hamid Al-Ghazali, the Islamic philosopher (1058-1111 AD), “The beauty and goodness of everything is to bring its perfectness that is appropriate and possible for it. If all its possible perfection is present, then it is very beautiful, and if some was present, so it has the beauty of what has been found”^[28].

3.4.2 Beauty and Proportionality

Proportionality is the most subtle aspect of beauty^[29]. It means that the component parts of something are related to each other. Mustafa Lutfi Al-Manfalouti

says in his book "Al- Nazarat" (1955), "Beauty is the proportion between parts of complex bodies, whether in tangible or intangible, in fact or in fiction." He adds: "A beautiful face is considered beautiful for the proportion between its parts. Similarly, a beautiful voice is considered beautiful for proportionality among its tunes."^[30]

3.4.3 Beauty and Morality

Islam views beauty as a basic value that a person aspires to as he does towards truth and goodness. The concept of beauty has been closely associated with morality. Hence, Islam distinguished between physical beauty and spiritual beauty^[28]. Sensual beauty is perceived through the senses, and spiritual beauty is perceived through the mind. For Ibn Sina, there is worldly beauty, which is the lowest, and divine beauty, which is the highest and a reflection of God and truth and linked to spiritual concepts associated with enlightenment^[31]. So, beauty is not a physical quality present in things, it is more than that, and the word "beautiful" and "beauty" has been mentioned in the Qur'an in eight verses. In only one place did God speak of physical beauty, and in the remaining seven places it was of moral or ethical beauty. For example, patience, which is considered one of the greatest qualities of the human soul is beautiful. Sincere forgiveness for the sake of God Almighty and the subsequent emotional release, which is far from selfishness and self-love is also beautiful.

3.4.4 Beauty and Utility

Beauty is related to perfection, and perfection means that a thing performs its purpose perfectly. Therefore, the beauty of things according to Islam is closely related to their functions as they achieve utility. Hence, beauty is inseparable from utility. God Almighty says in the Qur'an: "and cattle too he has created; you find in them warmth and other uses and some of them you eat. And in them there is beauty when you bring them home in the evening, and when you drive them forth to pasture in the morning. And they carry your loads to a land which you could not reach except with great hardship to yourselves. Surely. Your Lord is Compassionate, Merciful" – The Holy Qur'an, Surat An-Nahl, Verse 5. We notice that beauty is located among the four identified utilities of cattle, and this proves that it is neither a precursor nor

a consequence of a benefit, but rather an accomplice of it. This is also consistent with the terms of purpose and wisdom for which these cattle were made^[32]. We also note in this verse that the benefit is not limited to material benefit only but can be moral to please the soul or as a manifestation of the splendor of creation and the grandeur of the Creator.

3.4.5 The Limited Imitation of Nature

Beauty is one of the divine attributes, such as mercy and kindness. These qualities are manifested in nature as a reflection of the divine beauty in the earthly world^[33]. So, the attainment of beauty can only be achieved through imitating nature, which is a manifestation of divine or absolute beauty. Therefore, Muslims resorted to nature for inspiration and imitation. However, the imitation differed from that of the ancient Greeks. Islam rejected direct imitation without self-intervention^[34]. Since Islam prohibits the depiction of things that have soul, artistic works in Islam were restricted to imitating the inanimate nature, and they relied on abstraction and geometric shapes to express their ideas and beliefs. They also knew the golden ratio and applied it in many of their architectural and artistic works.

3.4.6 Aesthetic Judgment or Criticism According to Islamic Theory

Beauty, according to Muslim philosophers, is an attribute that is noticeable in things and brings pleasure and satisfaction to the soul. Accordingly, the aesthetic judgment or criticism is objective and subjective at the same time. It is objective according to the basic qualities available in the subject of criticism, such as moderation (Al-Jahiz 776-869 A.D.), the proportion between the parts (Abu Hayyan al-Tawhidi 922-1023 A.D.), and harmony and regularity (Ibn Rushd 1126-1198 AD) [34]. It is also subjective according to the psyche (the emotional side) or the reference of the recipient (custom and traditions)^[35].

For Sufism, the arts are an expression of the beauty of creation and the grandeur of the Creator. Beauty for them in particular, and in Islam in general, is characterized by centrality and unity. Allah is the center of the universe in Sufism and represents absolute beauty. For Sufism, beauty ranges from the beauty of particles in the universe to the absolute beauty represented by God Almighty, and there

are those who see absolute beauty first, and then the beauty of particles^[36]. In other words, there is a holistic perception of beauty that transcends the physical particles; looking at the beauty of these particles is considered a starting point to the realization of absolute beauty^[29]. This concept was reflected in works of art, including architecture, where we used to find many elements that represent this thought. Perhaps the Sulaymaniyah Mosque is a prominent example.

The researcher "Othman Nuri Tobash"^[37] analyzes the architectural characteristics of the Sulaymaniyah Mosque within the framework of Sufi concepts and says: "...and the mosque progresses in height, starting from its floor and finally reaching the central dome, which symbolizes the divine unity "Oneness", while the semi-circular and small domes are in harmony with the central dome showing the secret of one of the origins of Sufism, which is: "In unity there is abundance, and in abundance there is unity." In fact, the Sulaymaniyah Mosque embodies the concept of spirituality beautifully, as it symbolizes the transition from the many branches to the divine "unity", and then the return from that unity to the (many) branches (Figures 29 and 30).



Figure 29. The Sulaymaniyah Mosque^[74]



Figure 30. Sidi Abo El Abbas El Morsi Mosque^[75]

In addition to mosques, Sufis had many different religious buildings that they used to teach and spread their teachings in as well as practicing their religious rituals according to the Sufi approach, such as "Al Zawaya", "ATakaya", and "Arribatat." These buildings, regardless of their size, reflected the spiritual values of Sufism such as simplicity, modesty, self-denial, and a sense of mortality^[37].

"Allah is beautiful and majestic" (Ibn Arabi)^[38]. Beauty for Sufism is associated with majesty. In addition to the comfort and joy that beauty brings to the soul, a feeling of majesty is generated at the same time, that is, a feeling of dread for sensing the grandeur of creation. According to Ibn Arabi, beauty generates comfort and joy, but it requires a feeling of dread so that we avoid mischief that will cause us to be disrespectful to God Almighty. Majesty causes fear, but it requires comfort and joy so that we do not despair of God's mercy^[38].

Beauty and knowledge for Sufism are in a debatable relationship. Perception of beauty comes first, and then its sensation. This knowledge is innate, and then comes the deeper mental knowledge after beauty is sensed. That is why it was said, "He who tasted, has known."

In short, we say that the Islamic vision of beauty is complementary, whereby there is no beauty without benefit or good, nor beauty for the outer without the inner, and the awareness or perception of beauty reflects the sublimity of the soul as a result of the great faith in God, the Creator of all beauty^[39].

3.5 Beauty in the Renaissance

Classicism reappeared in the Renaissance, the period from the early fourteenth century to the early sixteenth century, after its absence throughout the medieval period during which artistic styles that glorified the Christian religion and reflected its own spiritual values prevailed. In the Renaissance, an architectural style appeared, known as "Renaissance architecture". Renaissance architecture, which first appeared in France and then spread throughout Europe to replace the Gothic style that prevailed in the Middle Ages, was considered a revival of Greek and classical Roman art, where designs and architectural elements were inspired by them.

The arts, including architecture in the Renaissance, were mainly dependent on the principle of imitating nature and on the beauty standards inspired by it

(proportionality, balance, perfect symmetry, harmony, clarity, order, and respect for human proportions). To apply the principle of imitation, interest in arithmetic and mathematical engineering increased. Studies have delved into the subject of aesthetic proportions, especially the golden ratio and its applications in various fields. The designs were more sophisticated and innovative than they were in both ancient Greek and Roman architectures, and many books were written on architectural theorizing. The most prominent architects of this period, whose influence remained for a long time later, were: the Italian architects Leon Battista Alberti (1402-1472) and Andrea Palladio (1508-1580).

Alberti is considered to be one of the main architects who contributed to the development of Renaissance architecture in Florence. He contributed important architectural works, such as two of the most famous buildings of the fifteenth century: the façade of the Church of Santa Maria Novella and the Palace of Rossellae (Figures 31 and 32). Yet, he is best known for his book “The Ten Books on Architecture,” which is the most important architectural treatise written on the rules and the basis of architecture during the Renaissance.



Figure 32. The Palace of Rossellae^[77]



Figure 31. Church of Santa Maria Novella^[76]

As for Palladio, he was well-known as the most influential architect and theorist in art history. He developed a new architectural approach in design (inspired by Roman architecture), which was later named after him; the architectural style that dominated the last stage of the Renaissance was known as Palladian architecture. Palladian later became a well-established style of architecture whose influence continues today (Palladian Arch, Palladian Motif, Palladian Window...). Palladio's architecture was characterized by the strength of expression and the revival of classical forms, especially Roman, and the adoption of symmetry, proportion, and clarity. Even though his façades seem simple or austere, they have a strong expression; he used ancient Roman pillars and details, but with a stronger expression. Palladio was well-known for using the golden ratio in most of his works especially his famous Villa La Rotonda (Figure 33). He left several books on architecture, the most important of which is: “The

Four Books on Architecture,” which was published in 1570 AD.



Figure 33. Villa Foscari, also called La Malcontenta. [78]

This era witnessed the beginnings of art liberation from the ideals and moral values. The French philosopher Descartes (1596-1650) played a great role in this transition. Descartes rejected the ideas of Plato’s ideal beauty and Aristotle’s imitation, and considered that perception occurs through the mind, and only through it we can explore the beauty of things by analyzing their materials and shapes and their relationship with each other. Thus, beauty became associated with the ability of the self to appreciate aesthetic judgment.

3.6 Beauty in the Enlightenment Era (Eighteenth Century) and the First Half of the Nineteenth Century

The eighteenth century is considered the era of rationality where the mind was considered the main reference for obtaining knowledge. Art was completely free from religious commandments, and new concepts such as creativity and innovation began to appear. Before this era, the concept of creativity was rejected by the fact that it is considered a “creation,” and creation belongs only to God.

During the eighteenth century also, the evaluation of artistic work became the responsibility of artistic academies, and the name of art judges was transformed into art critics, and aesthetic judgments were issued based on a number of criteria that remained to some extent influenced by the concepts of beauty of Greek philosophy, which are based on the concepts of harmony and compatibility in the imitation of nature.

In the second half of this century, “aesthetics” was founded by the German philosopher Alexander

Baumgarten (1714-1762 AD). Aesthetics is the thought that investigates the essence of beauty, and its name was inspired by the Greek word “aisthetos”, meaning “feeling.” Thus, Baumgarten defined aesthetics within the framework of science that searches in sensory or emotional perception and restricted the field of aesthetics to physical beauty, that is, what is perceived only by sense. He excluded the spiritual beauty represented by values and morals and excluded the beauty of nature. According to Baumgarten, aesthetics is the science that is concerned with the study of sensory knowledge, as opposed to the science of logic, which is concerned with the study of mental knowledge [40]. Since it is a science, it has laws just as the laws of nature that can be revealed through systematic and experimental investigations.

In general, aesthetics is considered one of the branches of philosophy that deals with the study of the artistic aesthetic phenomena and the associated feelings. It also studies aesthetic judgments and their relationship to taste, artistic creativity, and its conditions, through the philosophical method of analysis and mental reasoning.

The most influential philosopher of the eighteenth century who dealt with the subject of beauty is Immanuel Kant (1724-1804), who is considered one of the most important philosophers of “aesthetics” and one of the most influential in the modern era. His book “The Critique of Judgement” included a new theory about beauty. Kant approached beauty through the ‘judgment of taste.’ For him, beauty is not a rational or moral issue, but rather a matter of personal taste related to what is good for the recipient [21]. Thus, he would have placed beauty in a special field related only to taste and away from reasoning. Kant’s theory of “taste” subsequently had a great influence, especially for supporters of the art theory, art for the sake of art, who adopted it to defend their perspective on the independence of art from the human or natural world [16].

In his book ‘The Critique of Judgment’ [41], Kant identified basic characteristics of judgment of taste or aesthetic judgment, the most prominent of which are:

- The judgment of taste is not epistemological, nor is it logical. In other words, it is not done through knowledge nor logical analysis. It is only done through imagination and cognition and is intrinsically linked to the feeling of

pleasure. In short, for Kant everything that pleases without any rational representation, is beautiful.

- The judgment of taste is not related to any purpose or benefit. Feeling pleasure towards a beautiful thing differs from the feeling of satisfaction or joy that good, beneficial, or appropriate things leave us with. The latter is related to a form of human interest, while the beauty or aesthetic enjoyment is not related to any interest. It is a free cognition devoid of any purpose.
- The judgment of taste is a contemplative judgment in the sense that it only comes through meditation, which is the highest level of feeling. We feel pleasure when we see or smell a flower, but we judge it aesthetically through contemplation.
- General and personal taste. Although he considered judgments about beauty to be subjective, Kant asserted the existence of a universal taste or universal validity in addition to personal taste. The personal taste is the aesthetic judgment that the individual makes about the beautiful. Kant calls it the taste of the senses and it is a talent present in every individual. As for general taste, it is a sense of aesthetic taste – shared by everyone with good taste – which Kant called the “common sense.” This sense is of great importance, as it makes aesthetic judgments of general credibility that help explain typical works of art as an interpretation that makes them models to be emulated in every time and place. He also asserts that the beauty is what generates pleasure with no need for a rational reason.

Kant distinguishes between the beautiful and the sublime. Beautiful only produces a feeling of pleasure and satisfaction (e.g. seeing a beautiful flower). As for the sublime, it is associated with a special case in which the feeling of pleasure is mixed with distress or discomfort, such as seeing a stormy sea, or a towering mountain.

For Kant, taste is a talent of judgment only and not of creativity. The artistic aesthetic creativity is achieved through the “free play” of the genius imagination. Genius is an innate mental predisposition (a natural gift)^[16]. In short, for Kant, beautiful art

stems from the self, but it communicates with other human selves beyond the context of time and space since human beings agree on aesthetic matters more than they agree on metaphysical, ethical, and religious issues^[21].

3.7 Beauty in the Nineteenth Century

George Hegel (1770-1831 AD) is considered, according to many, the philosopher of this century and the spiritual father of ‘idealism.’ It should be noted that the word idealism was derived from Plato’s philosophy “ideas” which was influenced by it.

For Hegel, art, religion, and philosophy are the paths of the mind to reach the ‘absolute spirit.’ The absolute spirit is the highest level of consciousness or self-knowledge of Absolute idealism. The content of art, religion, and philosophy is basically the same, but the form of presenting this content is different. In art, the idea unfolds itself in a sensual form. In other words, art is the sensory presence of the spirit, where the idea is liberated from finality. While in religion, the idea identifies itself through imaginative conception. In philosophy, which is according to Hegel the highest stage, the idea is aware of itself through the concept in which the absolute spirit reaches absolute knowledge^[42]. Through what was mentioned, we see that art does not differ from religion or philosophy in terms of content, but rather in terms of form and level of attainability. Art, due to the limitations of its sensual-natured capabilities, is unable to reach the full awareness of the absolute idea or the spirit. Rather, its goal is achieving the absolute sensual embodiment.

For Hegel, the absolute is the soul or the divine element. It represents the content of art. Contrary to what is expected, it is not an abstract moral or idealistic entity, but rather it is related to the various objective relationships of man in this world (social, political, moral and historical ... etc.) in other words, “the absolute” represents the deepest interests of man^[42].

Art, according to Hegel, is the sensual embodiment (form) of an idea (spiritual content). The importance of art is that it reveals the spiritual interior of a person. Accordingly, the more works of art express the spiritual interior, the more they rise in perfection and develop in form^[20]. The more consistency between form and content is made, the more art is elevated, and artistic beauty, which stems from the human soul or soul, is attained^[43]. Hegel linked art

and beauty and considered the latter a prerequisite for any work of art. Hegel says: “No work is artistic unless it is beautiful.” Beauty is a way to reach the soul or the absolute. This spirit is central to Hegel's artistic philosophy. The existence, with all its natural, material and human phenomena, is one aspect of this spirit.

Unlike Plato, Hegel does not require imitation in art but considers that art that imitates nature does not produce genuine works of art, but rather produces crafts. The beauty of art is higher than the beauty of nature because it is the product of the spirit^[43]. The spirit is higher than nature, so this sublimity is transferred to artistic products. In addition, nature lacks freedom, unlike art which is based on freedom^[21].

In his book “Symbolic, Classical, Romantic Art”^[44], Hegel considers that art develops in parallel with the rise of cognitive awareness of absolute truth. Accordingly, he considered that art passed through three basic stages, namely:

- The Symbolic Stage. The symbolic style lasted for a long period of art history, specifically the period of eastern civilizations (Pharaohs, Assyrians, ...). At this stage, the relationship between form and idea (content) is not identical, whereby the external form can dominate the content, or it may surpass the corresponding meaning. For example, the image of “bull” in Assyrian art may mean the animal itself, but it may symbolize a different meaning such as strength or greatness^[45]. Architecture belongs to the symbolic stage, as it is the least to provide the spiritual content. The material used in it is a solid substance devoid of spirit, so the idea is abstract and incompatible with its physical form.
- The Classical Stage. In this stage, form and content coincide harmoniously. For Hegel, this stage is considered the pinnacle of art, where the ideal is achieved. This stage is evident in the period of ancient Greek civilization, and sculpture is the best expression of it^[44].
- The Romantic stage. It is the stage in which the idea transcends itself, liberates from the limited sensory forms in the real world, and realizes itself as an absolute spirit, so it floats in the world of the subconscious deserting the outside and getting confined to itself^[46]. Here the form becomes foreign to the idea, or

even lost in favor of the content. This stage is represented in medieval and modern art. It is most expressed in painting, music, and poetry.

According to Hegel, art ends when the artist dominates it, the content diminishes, and the objectivity disappears. Eventually, civilization reaches a stage in which art dies and gives up the task of presenting the truth where a new stage in the search for its essence begins^[45]. Furthermore, the aesthetic experience is rational with an emphasis on the sensory and contemplative character. Thus, Hegel rejects the importance that some – especially Kant – attribute to emotions in aesthetic judgements. In this context, Hegel says in his book “The Philosophy of Fine Arts” that “the work of art is not intended merely to arouse one emotion or another because in this case it will not be distinguished from other forms of activity such as eloquence, historical writings, and religious preaching.” “A work of art cannot be art unless it is beautiful^[47].” Thus, taste, in his opinion, may not be suitable for establishing a philosophical artistic aesthetic theory, and it cannot be adopted alone in making aesthetic judgment as well. Evaluating a work of art requires knowledge, memory, contemplation, and an active imagination capable of perceiving shapes, analyzing, and making comparisons between them^[16].

This new philosophical atmosphere – especially Kant's – influenced the artistic products in this period. Some artistic movements began to emerge liberated from the strict classical norms, such as Barocco and Rococo, which contributed to a gradual and slow transition from rigor classicism to flexible modernity. The Baroque style was distinguished by its grandeur, curved and twisting shapes, and the use of columns and carvings in a complex manner; the most famous example is the Palace of Versailles (Figure 34).



Figure 34. The Palace of Versailles^[79].

The Rococo, derived from Baroque, was distinguished by its sensual aesthetic style. This style expressed fantasy, romance, and elegance, and was characterized by soft colors, curvy lines, and high ornamentation; the shapes mainly used were asymmetrical shells, plant leaves, flowers, angels, and far Eastern motifs. The Rococo style extended to all types of arts: architecture, interior design, painting, and sculpture, and was distinguished from Baroque by being softer, lighter, and more delicate (Figure 35). It is worth noting that these movements, due to their exaggeration in decoration, did not last long especially after the events and changes that took place at the beginning of the twentieth century in various areas of life. That required a radical change in artistic values and standards, including architectural ones.



Figure 35. The Rococo style^[80]

Thus, the nineteenth century is considered the century of the complete liberation of art from classical values where beauty abandoned imitation of nature, and where the beautiful became the strange, the unfamiliar, and the original. As a result, classicism

comes to an end after its standards and principles had changed, closing a major period in the history of art, and opening the doors to modernism which is based on different rules and standards.

4 Conclusion

Classicism is distinguished from other art schools since it lasted for a very long time. It was also often a reference and a source of inspiration for many rulers and architects because of its proportion, balance, and strong expression despite the simplicity of its forms. Classical art, including architecture, was not spontaneous or freed according to the designer's desires, but it was based on specific rules and regulations (golden ratio, Fibonacci sequence, etc.), as well as on physical and cosmic principles and intellectual thoughts that were linked to the prevailing philosophy at that time.

The exploration of beauty secrets started with philosophy through reflections and ideas of philosophers about what beauty is (Socrates, Plato, Aristotle, ...). These ideas were based on the values of goodness, utility, and morals by mimicking the nature which represented for them the absolute beauty. Man alone is incapable of creating beauty which is a divine aspect. He only imitates beauty that exists in nature through simulation or inspiration.

Classical criticism and its standards of beauty had taken a long path which began with metaphysics at its highest levels with Plato's idealism. Then, with time and with the advancement of science, beauty started to liberate from all values to become a value in itself. Thus, aesthetics moved to the critical stage that was influenced in its beginnings by rationality with Descartes where the production of beautiful art – including architecture – became a rational process with specific conditions and factors that get influenced by it and affects the way it is perceived. Then, aesthetics reached experimentalism with Kant, only to go back a new form of idealism (Absolute idealism) with Hegel.

Philosophy is affected by society's events and changes. This leads to a change in beauty standards to become more compatible with the emerging needs of peoples, whether it is material, psychological, or spiritual. Consequently, this will affect the artistic product in general and the architectural one in particular.

Aesthetics – unlike all other sciences – is subjective as much as it is objective. This explains the difference in judgments or aesthetic evaluations from time to time or from one place to another. It is objective since all those who dealt with the issue of beauty, including mathematicians, physicists or philosophers, have agreed that in order for beauty to be achieved, some conditions must be met. For example, proportion, balance, harmony, and order, as all confirmed, are the most important requirements for beauty. It is also subjective since it is being strongly linked to time and place; time in terms of events and changes in all aspects of life which affect the philosophical vision of society, and thus the standards of beauty. It's also linked to the place and what it imposes in terms of conditions, tendencies, common taste and needs related to the human and geographical environment. Here the subjective is divided into two: common and personal. Common that concerns a certain group or society, and personal that is related to the artist himself (his personality, experiences, past, philosophical beliefs ...).

All this makes the evaluation of beauty a delicate and complex process in which many issues must be taken into account in order to have an objective, fair and correct judgement.

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