

SYMMETRY AS AN AESTHETIC FACTOR

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Abstract—In classical antiquity symmetry meant commensurability and was believed to constitute a canon of beauty in nature as in art. This intellectualist conception of beauty persisted through the Middle Ages with the addition doctrine that the phenomenal world manifests an imperfect replica of the ideal symmetry of divine Creation. The concept of the Golden Section came to the fore at the Renaissance and has continued as a minority interest both for organic nature and for fine art. The modern idea of symmetry is based more loosely upon the balance of shapes or magnitudes and corresponds to a change from an intellectual to a perceptual attitude towards aesthetic experience. None of these theories of symmetry has turned out to be a principle by following which aesthetically satisfying works of art can be mechanically constructed. In contemporary theory the vaguer notion of organic unity has usurped the prominence formerly enjoyed by that of balanced symmetry.

From classical antiquity the idea of symmetry in close conjunction with that of proportion dominated the studio practice of artists and the thinking of theorists. Symmetry was asserted to be the key to perfection in nature as in art. But the traditional concept was radically different from what we understand by symmetry today—so different that “symmetry” can no longer be regarded as a correct translation of the Greek word *symmetria* from which it derives—and some acquaintance with the historical background of these ideas is essential in order to escape from the imbroglia of confusion which has resulted from the widespread conflation of the two.

To the Greeks symmetry meant commensurability, and two magnitudes were said to be commensurable if there exists a third magnitude which divides into both without remainder. As applied to works of art symmetry meant the visible commensurability of all the parts of a work to one another and to the whole. A statue, for example, or a building was symmetrical if it has some easily discernible part such that all other parts were exact multiples of it so that it served as a visible and apprehensible module. This idea of beauty or perfection was assumed to apply in nature as well as in art. It was thought that every species or natural kind has an ideal set of proportions, an ideal symmetry, from which all individuals deviate in a greater or less degree but by their approximation to which their beauty can be assessed. The ideal of the artist was to reproduce, not the imperfect natural objects which were his models, but the ideal symmetry characteristic of their species and his success was judged by the extent to which he was thought to have embodied this ideal symmetry in his work more perfectly than it was manifested in his models. The many lost “canons” of antiquity, the most renowned of which was the *Canon* of the sculptor Polyclitus (active circa 450–420 B.C.) were attempts to discover practical rules for the realisation of these ideal proportions. Similar principles were current for architecture and a rather confused account of them was given by the Roman architect Vitruvius in his treatise *De Architectura* (written shortly before 27 B.C.), which, rediscovered by Pollio and printed in 1486, remained for centuries the aesthetic bible of Europe for architecture. Vitruvius wrote:

The design of a temple depends on symmetry, the principles of which must be carefully observed by the architect. They are due to proportion. Proportion is a correspondence among the measures of the members of an entire work, and of the whole to a certain part selected as a standard. From this result the principles of symmetry. Without symmetry and proportion there can be no principles in the design of any temple; that is, there is no precise relation between its members, as in the case of those of a well-shaped man. (111,i)

This preference for intellectually apprehensible rather than sensuous beauty corresponded to the basic cast of the Greek temperament, their demand for order and comprehensibility everywhere and their abhorrence of all that is vague and formless. It was an outlook on the

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world which found characteristic expression in the numerological mysticism of Pythagoras and explains why the philosopher Plato could declare that the five regular solids are the most beautiful of things. It lies at the root of what has come to be known as the "idealism" of classical art. As Professor Rhys Carpenter has said in his study *Greek Art* (1962):

The sculptor who adheres to a simple integral canon, however narrowly its prescriptions may conform to anything observable in his race and period, will never produce an individually characterized face, whether true portrait or plausible possible likeness, but only a geometrically ideated abstraction. The so-called "idealism" of classical art is not simply due to a generalisation and regularisation of the contours, but more than all to this deliberate substitution of integral ratio, intact and entire, for the chance approaches to it discoverable in nature's own structural symmetry. The difference in meaning between our word "symmetry" and the Greek "*symmetria*," from which it is descended, defines very exactly the difference between *ideal* beauty as we conceive it and *ideated* beauty as Greek sculpture created it by applying a modular canon. (p. 160)

This intellectual conception of beauty persisted through the Middle Ages. Thus St. Augustine could say:

I am delighted by the highest equality, which I apprehend not with the eyes of my body, but with those of my mind. I, therefore, believe that the more what I see with my eyes draws near to what I apprehend with my spirit, the better it is. [*De vera rel.*, XXXI, 57]

And towards the close of the period St. Thomas Aquinas wrote:

Beauty . . . is the object of cognitive power, for we call beautiful things which give pleasure when they are seen; thus beauty rests on proper proportion, because the senses delight in things with proper proportion as being similar to themselves; for the sense and all cognitive power is a kind of reason. . . . [*Summa theologiae*, I, q. 5]

The two fundamental assumptions of classical aesthetics continued virtually unquestioned at the time of the Renaissance: first, the belief that the same principles of perfection apply in nature and in art and, second, contrary as it very often was to practice, that the representational realism asserted to be the goal of the artist should depict not the imperfect models available in nature but an ideal symmetry of the type, which can be discovered mathematically. It was this which led to the belief, which inspired the Academies and culminated in Le Brun (1619–90), that the principles of taste and expression can be formalised and imposed as disciplinary doctrine. To their basic aesthetic assumptions the artists and connoisseurs of the Renaissance also added the belief that the ideal symmetry which is imperfectly manifested in nature was concretely exemplified in the works of the ancient sculptors—although at that time these were known mainly in Roman copies or in fragments. It was this belief which was the central inspiration of the Neo-Classical movement, whose chief voice was Johann Joachim Winckelmann (1717–68).

Renaissance artists and scholars were intoxicated with mathematics and it was at this time that the doctrine of the Golden Section or, as it was then generally known, the *Divine Proportion* came to prominence. This sacrifices exact commensurability but imposes a single ratio throughout. Called by Kepler "one of the two great treasures of geometry" and "a precious jewel," it was held to be the key to aesthetic configuration in all the arts. Fra Luca Pacioli published his influential *Divina Proportione* in 1509 with plates by Leonardo da Vinci and incorporating an Italian translation of the *De Quinque Corporibus Regularibus* of Piero della Francesca. This Divine Proportion arises when a line is divided in extreme and mean ratio, i.e. so that the ratio of the whole line to the greater section is equal to the ratio of the larger to the smaller section, or more generally the proportion which arises between two relations which have one term in common, when one of the three terms is the sum of the other two terms. Interest in this proportion was revived by A. Zeising in the middle of the nineteenth century† and for long

†A. Zeising, *Neue Lehre von den Proportionen des menschlichen Körpers* (1854) and *Aesthetische Forschung* (1855).

was believed at least by a minority of interested persons to be the universal key to aesthetic symmetry in nature and in all the arts. Gustav Theodor Fechner, a pioneer of experimental psychology, published in *Vorschule der Aesthetik* (1876) the results of experiments which he claimed to have shown that rectangles formed in accordance with the Golden Ratio are aesthetically preferred. But later experiment has thrown considerable doubt upon these results. In *The Curves of Life* (1900) Theodore Cook claimed to have shown that the spiral curves typical of organic growth display a symmetry equivalent to that embodied in the Divine Proportion. A still more detailed study by d'Arcy Wentworth Thompson, *Growth and Form* (1917), showed that the spirals in some organic structures correspond with the famous Fibonacci series. These books have been influential but not convincing. There are interesting but more cautious papers by C. H. Waddington, F. G. Gregory and Joseph Needham in *Aspects of Form* (1951), edited by Lancelot Law Whyte. Here Waddington says:

We come then to conceive of organic form as something which is produced by the interaction of numerous forces which are balanced against one another in a near-equilibrium that has the character not of a precisely definable pattern but rather of a slightly fluid one, a rhythm.

Comparing this with the products of fine art, he adds:

There is, in a human work of sculpture, no actual multitude of internal growth-forces which are balanced so as to issue in a near-equilibrium of a rhythmic character. We should therefore not expect that works of art will often arrive at the same type of form as we commonly find in the structures of living matter. Much more can we anticipate an influence of man's intellectualising, pattern-making habit of simplification, diluted perhaps by an intrusion of unresolved detail.

There has in addition to all this been a very considerable volume of work done in the attempt to prove the importance and prevalence of Golden Section symmetry by the direct analysis of acknowledged masterpieces and works of outstanding repute. The many studies are too numerous to enumerate individually but mention should be made of *Ad Quadratum* (1921), a detailed study of classical and medieval church architecture by F. M. Lund, who purports to show "the aesthetic superiority over all other proportions" of the Golden Section. A typical example of the application of this method to famous paintings is *Geometry in Pictorial Composition* (1969) by Brian Thomas. The theory of the classical idea of symmetry has been admirably expounded in several books by Matila C. Ghyka, including *Esthétique des Proportions dans la Nature and dans les Arts* (1927) and *Essai sur le Rythme* (1938).

If it were possible to discover complex sets of "ideal" proportions which could serve as a standard by their approximation to which the beauty of natural objects might be assessed, it should not be difficult to produce statues conforming to the "classical" or "ideal" tradition of art even more successfully by means of computers than by taking life-casts from models chosen for their near-approximation to the ideal symmetry. (Painting introduces other complications arising from the demands of composition within an area. One would have to assume the universality of the Golden Section or some other norm of symmetry, apply it to the whole area and drop the notion of approximating individual figures to different sets of proportions.) But despite the enormous mass of data that has been accumulated, no positive conclusion has been reached about the key position of Golden Section symmetry. The effect of optical illusion was noticed as early as the sculptor Lysippos of Sikyon (active in the latter part of the 4th century B.C.), of whom Pliny records from an earlier source: "There is no Latin word for the term *symmetria*, a quality which he preserved with the utmost precision by a new and previously unattempted system which involved altering the "square" figures of earlier sculptors; and he often used to say that by them men were represented as they really were, but by him they were represented as they appeared." [*Nat. Hist.* xxxiv, 65] (Perhaps what he meant was that instead of making his figures to embody the ideal norm of symmetry, he made them so that they *appeared* to do so. A work which actually and measurably conforms to a given pattern of symmetry will not usually *look* as if it does so.)

An attempt was made to allow for optical illusion by some of those who repeated Fechner's experiments on aesthetic preference with simple rectangles of different proportions. But in

pictures and other more complex objects its effects are complicated and far-reaching. They can be studied in the standard works on optical illusion or in such books as M. H. Pirenne's *Optics, Painting and Photography* (1970) and they have been exploited by exponents of Op Art for their own purposes. Because they are so many and complex exact measurement in relation to the proportion indicated by the Golden Section has not proved a feasible project. One can say that other things being equal an upright line looks shorter than a horizontal line of the same length, that figures of equal size in receding perspective seem to be of different sizes. But the visual action of one shape on another in three-dimensional painting, the impact of psychological prominence when shapes have representational meanings, the influences of colour contrasts, and so on, differ with every example and cannot be exactly calculated. Yet the application of geometrical analysis to paintings without taking these factors into account must lead to unreal results. Moreover, in the language of Phenomenology, what one should be studying is the visual object, that which we see, not the physical substrate of what we see. (This may have been what Lysippos was getting at). For these reasons among others it has not proved possible to verify the ubiquity of Golden Section symmetry in art that has been acknowledged to be great. And certainly no modern artist has ever produced great art by the deliberate application of the Golden Section. Whether the ancient artists did so or whether they followed some more rudimentary rules of thumb is an open question.

As has been said, the modern conception of symmetry is very different from that inherited from classical times and given new prominence at the Renaissance. The change is consistent with radical though not always deliberate changes in fundamental aesthetic assumptions. Our idea of beauty in art has become emotional and expressive; intellectual perspicuity counts for less than it did in the past. Modern thinking is less than convinced that the same aesthetic principles apply in nature and in art. We repudiate the basic assumptions of Renaissance aesthetics, the belief that there is an "ideal" symmetry of natural objects, whether based on the Golden Section, on "dynamic symmetry"[†] or on any other mathematical formula, and we do not accept the belief that artistic excellence can be achieved by realistic representation of a naturally beautiful object. It is no longer necessary to argue, as that too little remembered critic R. H. Wilenski so ably argued in his book *The Meaning of Modern Sculpture* in 1932, that a life-cast of a fine figure of a man or a beautiful woman does not automatically produce a work of art. And we accept without a qualm what artists have long enough known, that the representation of what is ugly, mean or repulsive in nature can have its proper place in pictorial art. We happily accept that representation itself is neither a necessary nor a sufficient condition of fine art. If Golden Section symmetry retains an interest for us, it must be against the background of these changed aesthetic attitudes. In fact when people speak of symmetry today we naturally think of some sort of geometrical regularity and repetition of forms rather than of any specific mathematical ratio. In his *Principles of Symmetry* (1917) Professor F. M. Jaeger defines it as follows: "Symmetrical figures are such as are similar to themselves in more than one way." This is rather more general than what is commonly understood by symmetry—that constructions are symmetrical if they repeat either their main forms or a mirror image of their main forms on either side of a medial axis.

In the first place it is at once obvious that symmetry involving the repetition of elementary or easily distinguishable elements is characteristic of the sort of patterns which properly belong to wall-papers, textiles, carpets, etc., and perhaps finds its finest expression in the decorative aspects of Islamic architecture. Even so, it is noticeable that in fine decorative art produced by craftsmen rather than by mass production methods in a factory the pattern elements, though remaining recognizably the same through repetition, are deliberately subjected to variations in colour or design or orientation and conscious irregularity of a minor character is often introduced. This is the case in old oriental carpets, pre-Inca textiles of Peru, Byzantine mosaics, and so on. Symmetry is also sometimes attributed to art objects as a quality of the composition as a

[†]The concept of *dynamic symmetry* was introduced by Jay Hambidge in his book of that name in 1920. It depends on the idea of commensurability among rectilinear areas instead of commensurability among linear magnitudes. Hambidge reduced all design to rectilinear design and called those designs symmetrical which are constructed from commensurable areas. He spoke of "static symmetry" when designs constructed in commensurate areas display linear commensurability among the lines by which the areas are bounded and "dynamic symmetry" of designs composed in commensurate areas whose bounding lines are not commensurable. The evidence that "dynamic symmetry" so conceived was known and used by the ancient Greek artists is inconclusive.

whole when there is no exact duplication of forms but a certain balance, or equality of “weighting,” about an imaginary axis. In this less precise sense Baroque or Rococo art may sometimes be called symmetrical despite its deliberate asymmetry. In this vaguer sense symmetry is often described by the still more vague term “harmony” and its relevance for aesthetic quality has long been recognised. In the light of his general world-view it may well be that Plotinus had something very like this in mind when he wrote:

Now by almost all persons it is maintained that it is the symmetry of the different parts with respect to each other, and the beautiful colour, which produce beauty for visual observation—beauty is identical with symmetry and being shaped after fixed proportions.

If he did mean something like this and was not merely repeating the classical view of symmetry current in his day, he may have anticipated what Dürer had in mind when he said: “The accord of one thing with another is beautiful, therefore want of harmony is not beautiful. A real harmony linketh together things unlike.” (I used these two quotations in an earlier work, *Theory of Beauty*, 1952.)

It remains now to consider the relevance of this modern concept of symmetry for the furtherance of aesthetic experience. For this purpose it is necessary to consider briefly that thorny topic about which more nonsense has been written than most—the nature of aesthetic observation and aesthetic satisfaction.

Aesthetic perception—I must be dogmatic for the sake of brevity—is a skill which needs to be cultivated and developed. It is the more difficult to acquire because it runs counter to our ordinary habits of perception. In everyday life we look out on the world with the practical purpose of discriminating things and the relations in which things stand to one another and we automatically cease to attend to our visual impressions when they have served this practical purpose. Aesthetic perception is the contrary of this: we look at selected objects for the purpose only of seeing and in the endeavour to perceive the whole of the presentational content without practical inhibitions. In the words of Professor Monroe C. Beardsley, the primary marks of aesthetic character are “the presence in the object of some notable degree of unity and/or the presence of some notable intensity of regional quality.”[†] It is upon these that we direct attention, upon what has been called the *organic unity* of the object (it offers itself to perception as a unified whole not only as a bundle of analytical parts) and upon the expressive character of its contained qualities. Beardsley rightly indicates that this is the source of what he calls aesthetic “gratification” or aesthetic “satisfaction.” I have gone a step further than this in my own writing on aesthetics and have advanced the view that the much vaunted pleasure which many people experience in aesthetic perception derives from the successful exercise of enhanced perceptual activity upon an object adequate to arouse and sustain it at more than ordinary intensity. It is therefore analogous to the pleasure we derive from the enhanced exercise of any other human faculty for its own sake—to the pleasure some people take, for example, in the enhanced exercise of the reasoning power demanded by higher mathematics, logic, ontology or aesthetics. It is to things which are suitable to arouse and competent to sustain enhanced perception for its own sake that we attribute aesthetic quality or call works of art.

Let us now consider the aesthetic relevance of these various modes of symmetry. First, it is clear that the symmetry of repeating pattern provides a very elementary aesthetic stimulus. It may serve to arouse attention, particularly if the repeating elements are unfamiliar or if they carry personal associations. But it cannot hold or enhance perceptual attention. At most such patterns provide a congenial perceptual background, unobtrusive and undemanding—which, indeed, is their purpose. The deliberate variations introduced by craftsmen augment the visual interest, but do not alter the basic character of the genre. Much the same thing can be said about the symmetry of individual elements and of individual objects such as crystals or snowflakes. They can arouse interest, curiosity and admiration. But visual interest in them is short-lived and superficial: In contrast to the impact of an artistic masterpiece, perceptual attention soon wanders, never goes deep. There is no enhancement of perception.

[†] See the essay “The Aesthetic Point of View” reprinted in the volume of selected essays under that name, edited by Michael J. Wreen and Donald M. Callen, 1982.

The more complex kind of symmetry which consists not so much of multiple repeated elements as of balance and weighting about a medial axis has closer affinities with the aesthetic. It is the sort of construction which often inspires non-iconic abstract art. But to be effective it must not be too obvious but remain subordinate to other sources of perceptual interest. Certainly such symmetry of balance can occur in objects—advertisements, documentary photographs, maps, etc.—which no one would dream of using for aesthetic ends. Furthermore, it is subject to optical conditions. For example, horizontal symmetry of this sort is much more obtrusive than vertical, as can easily be proved in the following way. Take a photograph of scenery which is fairly evenly weighted about a medial axis, giving horizontal symmetry. Turn it on end so that the weighting becomes vertical above and below a horizontal axis, and the sense of symmetry virtually disappears. It seems that for aesthetic efficiency there must be some repetitive regularity which acts as a perceptual background without obtruding too openly into awareness. If it attracts attention too openly on itself, our awareness becomes intellectual rather than perceptual, and the modern concept of aesthetic experience is perceptual rather than intellectual. Finally, the more recondite forms of balance and interplay of parts often described as harmony come close to what is known as organic unity, although "organic unity" is the wider term and includes qualities which could not sensibly be brought within the category of symmetry. Even so, symmetry in this extended sense cannot be subjected to formula or rule but is directly detected by those who have developed the skill of artistic appreciation.

It is as certain as anything in this field can well be that in none of these senses can symmetry be regarded as a necessary condition of successful art. Much American abstract expressionism and much European gestural art has not only neglected symmetry but has deliberately eschewed it. Some Chinese painting "balances" large expanses of empty space against small areas of motif in a way which contradicts Western ideas of symmetry. And these are but a few examples from many. Nor is symmetry a sufficient condition. Too much or too obvious symmetry defeats its own purpose. When it is unobtrusively subordinated to other perceptual stimuli symmetry may enhance the overall aesthetic potentiality of a work; otherwise the aesthetic appeal is annulled.

The foregoing article distinguishes two separate ideas which are commingled in the current concepts of symmetry. They are *commensurability*, which from the time of the Renaissance tended to be interpreted in the form of a single pervading ratio such as the Golden Section, and *balanced repetition*. The former aims at great precision, the latter is more vaguely conceived. The aesthetic implications of these ideas are briefly touched upon.