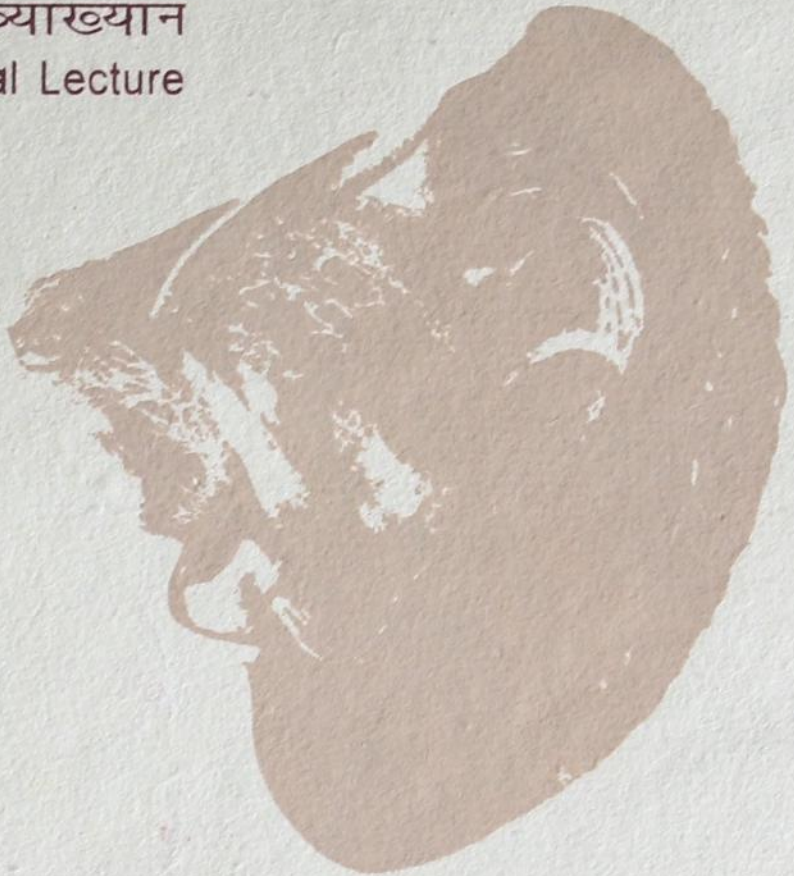
कुमारस्वामी स्मृति व्याख्यान

Coomaraswamy Memorial Lecture



GEOMETRY – THE ARCHETYPAL-FORM LANGUAGE

In his 'A New Approach to the Vedas', A K Coomaraswamy states that "symbolism and imagery ('pratika', 'pratibimba', etc), the purest form of art, is the proper language of metaphysics." In fact, all sacred art is linked to, and dependent on, a metaphysical doctrine from which it receives not only its subject-matter but also the guidelines for the composition of images and treatment of form.

If, on the one hand, mathematics and geometry are found to be the most adequate medium for transcribing the concepts of metaphysical reality, on the other, it is in the geometrical figures and bodies itself that the ultimate archetypes of all living form can be reduced in a final term. We are reminded of Galileo's aphorism that "the Book of Nature is written in characters of Geometry'' – the essential differences between one 'species' and another are merely differences of proportion, of relative magnitude.

Geometry, as it were, provides a plane of refraction between the world of essential being and the world of formal manifestation. It is, therefore, not surprising to observe the important role that geometrical figures have played as the most natural language in every system of sacred imagery for determining the symbolic character of form, whether in the West or in the Orient.

Out of the three main lines of geometry today – the metrical, the projective and the analytical – the metrical line has been more closely related to Euclidean geometry and has, therefore, been of great structural importance to the visual arts. Projective geometry, dealing with the projection and trajection of bodies in space, has helped understand the rhythmic relationships of movements of bodies in three-dimensional space – real or simulated, as in the visual arts.

According to Alice Boner, geometrical forms are essentially functional – not in a mechanical or material sense but

transcendentally. They are not abstractions but living images of cosmic forces. As graphs of definite processes, of laws and energies, they act alike on the sensible and suprasensible levels. Quite apart from mathematical definitions, it is this specific morphology of geometrical figures which is the basis of all symbolic form, whether it be pure or qualifying and circumscribing natural form.

In order to experience the spiritual aspects of things, the form-language of sacred art is bound to fall back upon the archetypal configuration to create a significant form. This implies transfiguration of phenomenal entities into essential qualities, in the sense of Platonic 'Ideas' or the Tantric 'Tattvas'.

The perception of geometry has been closely related to concepts of proportion and significance of numbers, both in the West and the Orient, for purposes varying from creating ordered and rhythmical relationships to creating highly symbolic forms that have almost a magical and transformative effect on the human mind, like the Yantras and the Mandalas of Tantric Buddhism.

'Proportion', according to the dictionary definition, is an equality or identity between ratios. 'Ratio' expresses the comparative value or magnitude of two quantities. 'Proportion' is the sameness of such comparative values. It is used to such related terms in the West as 'eurhythmy', 'symmetry', 'concinnitas'. The common meaning all these terms convey, however, relates to a concern with ordered relationship, visible or invisible.

The role that visible effects of proportion has played in the history of human civilisation has to be understood in terms of its importance as a concept relevant to the visual phenomenon as a measure of order.

One aspect of proportion is linked to abstractions and the assumptions about what is universal and general: God, the nature of the Universe, the organization of society. The other is concerned

with concrete, specific human achievement and experience which occurs in music, the visual arts and architecture.

God and the nature of the Universe were linked to proportion early in the history of Western civilisation. The Greeks, who inherited the great Egyptian tradition of geometrical expression as manifested in their pyramids, symbolizing their view of the cosmos, attempted to realize a harmonic and proportional order in the world. Pythagoras declared that the ultimate truth about the structure of the Universe lay in certain ratios and proportions. With Pythagoras and his school began the mathematical approach to nature – a starting point of the Western view of the world. Thereafter, Plato explained that the body of the Universe was made "...out of....elements which are in number four...harmonized proportion. And Plutarch later declared that "...God's intention was ... to reduce nature to a cosmos by the use of proportion and measure and number." Number symbolism, number mysticism and number aesthetics had seized a firm hold on people's minds long before the time of Pythagoras. The Egyptians and Greeks discovered the principles of 'dynamic symmetry', based on a so-called summation series, resulting in the concept of 'Divine proportion'. In their own time, Leonardo da Vinci, Michelangelo and many others adhered to it in their creative work.

For centuries, Euclid was the source for the mathematical treatment of proportion. The 'Divine proportion' – a comparison of two or more equal ratios – was a concept of progression or ordered sequences in which quantities may be related to each other.

The Christian mind corroborated Pythagorean and Platonic doctrines regarding the harmonic structure of the world from the Biblical passage, "Thou hast ordered all things in measure and number and weight." Accordingly, God became the familiar image as the "finest, greatest of geometers", not only in 12th century

humanism but also for the 17th century audience. It provides an interesting analogue of personification of the creative power in 'Viswa-Karma', the Omnificent, who has been regarded as the great architect of the universe in India since Vedic times.

While interpreting the statement attributed to Plato that "God is always busy with Geometry", Plutarch was not only referring to God's use of proportion in creation – he also related the concept of proportion to political thought and organisation of society. Rousseau further extended Plato's argument about a cosmic harmony based on proportion to his ideals of morality.

Plato believed in an order and harmony of the soul for, as he said, "the soul itself is a counterpart, in miniature, of the soul of the world, which has an everlasting order and harmony of its own...revealed now in the visible architecture of the heavens."

The harmony of the world, based on proportion according to some Greek thinkers and their later followers, was not only revealed visibly in the starry heavens but equally in the audible consonances of music. To grasp the full meaning of proportion in the realm of sound, one had to understand the conceptual implications through which terrestrial musical harmony seems to be linked to a more universal harmony which is believed to pervade all of creation. Interestingly, this concept finds an affinity in the significance of 'Om', the mystic sound symbol in Indian tradition. Pythagorean doctrine that all nature consists of harmony arising out of number relates to the fact that simple numerical relationships exist between frequencies of vibration in musical chords harmonious to the human ear.

In the visual realm, however, one would believe without any doubt that proportion was considered important both in antiquity and later. Vitruvius, in his 10 books on architecture, treats the idea of proportion at some length in one of them and establishes a correspondence between the human body and a perfect building. In one ~~of~~ his books, he elaborates on the idea and explains that the

correct proportions for a temple may be compared to those found in a well-shaped man. He justifies this by a statement that "nature has designed the human body so that its members are duly proportioned to the frame as a whole", and he goes on to inscribe the human body into circle and square – two regular figures which had long been considered images of perfection.

Egyptians applied a complicated grid system for the construction of figures. In the classical grid, the figure is divided into 18 squares from the sole of the foot to the hairline: the grid is applied to ensure the 'correctness' of the rendering of the human body. This is comparable to proportional systems in iconographic images both in Hindu and Buddhist traditions. I may add here that grid systems are increasingly being used by artists in many areas of applied design e.g. designing a book layout.

The medieval world inherited the concept of parallelism between the human body and the world, between man as a microcosm and the macrocosm of divine creation. The Christian interpretation connected it with the scriptural statement that the Lord created man in his own image. The principles of proportion infused with spiritual significance have also been an active factor in architectural design during the age of humanism. The equilateral triangle, the right-angled isosceles triangle, the square, the pentagon, the derivative figures like the octagon and decagon formed the basis of medieval aesthetics.

The direct connection between anthropomorphism and geometry which one observes in the illustration of the Vitruvian man, showing the human body and the geometry of circle and square, point to the fact that for many centuries, geometry was the preferred method of ensuring proportional disposition in design. Proportions and schemes used by medieval master-masons as the 'quadratura' – a method of obtaining a progression of dimensions from a sequence of squares and diagonally inscribed squares – and 'triangulation' – where major points are determined by equilateral

triangles – had a deeper, spiritual meaning related to cosmic order – the God-given harmony of the Universe.

Whereas on the one hand, such an insistence on geometry may be related to Platonic ideas about the high dignity and spiritual stature of geometry, on the other it signifies the usefulness of geometry as a practical aid in planning the main layout of a design in actuality. For instance, one way of laying out a building on the ground was with the help of chords stretched between stakes – chord being used for measuring of distances along a straight line, or for other geometric operations, such as the construction of right angles and regular sub-divisions of the circle. In many early civilisations, the stretching of the chord was a ritual act to be performed by priests or the King. Incidentally, it may be mentioned that the earliest Hindu names for geometry are derived from the Sanskrit words for rope or chord – 'sulba' and 'rajju', and the geometrician was called holder of the rope.

Geometry and proportion, towards the late 17th century, rapidly became mere tools to be mastered rationally and discarded at will. Architects could no longer be convinced that they were in the possession of a certain knowledge of what was beautiful merely because it conformed with cosmic order. They relied more on subjective taste as, in many other respects also, what had appeared to be 'objective and absolute' turned out to be 'subjective and relative'.

The more we become impressed by the proportionality present in the organisation of organic and inorganic matter, the more we learn about the structure of nature in and around us. The pleasing aspects of organic forms stem from their high degree of general regularity combined with the infinite variety of detail. The rule of order distinguishes organisation from chaos, for it is necessary for a unitary system. Scientific research has provided ample material on this, although as yet we are not clear how the transition is to be

made from this level of order to that which prevails in man-made designs. There has to be a certain significance of a concern with proportion in the visual realm other than as a purely academic or historic pursuit.

The biologist, Sir D' Arcy Thompson, author of the most intriguing book, 'On Growth and Form', once quoted a statement by Kant: "....it was nature herself and not the mathematician who brings mathematics into natural philosophy". For example, snow crystals provide the best known specimens of hexagonal symmetry in an infinite variety of formal beauty.Pentagonal symmetry is frequent in the organic world. The reason for it, perhaps, may be found "not so much in some peculiarity of the organisms involved but rather in the properties of space and unique features of the pentagon as compared with other polygons, because in the pentagon alone the sides show the same degree of symmetry as the diagonals. Recently, photography has provided new experiences, from the macroscopic down to the molecular, of geometric stacking and spacing patterns, along grids of varying degrees of regularity – the crux of organic form.

If there is any lesson in the study of organic nature, it is that there is order in the gross with freedom of excursion in the small. Our sense of beauty only confirms it, for it combines pleasure in contemplating the gross, over-all order with appreciation of pleasing variations of detail.

Beauty is bound up with symmetry, which is today generally linked with balance. For, symmetry denotes the sort of concordance of several parts by which they integrate into a whole.

In art, the problems of symmetry signify rest and binding, asymmetry, motion and loosening -- the one, order and law, the other, arbitrariness and accident, the one, formal rigidity and constraint, the other, life , play and freedom.

According to Hermann Weyl, bilateral symmetry is only one of many types of symmetry that prevail in crystals and in plant and

animal life. It is the symmetry of the human body, and for that reason of great importance to mankind. Again the concordance of the two halves of the body can be expressed in terms of ratios and proportions.

The attitude of Eastern philosophy with regard to symmetry, however,is in striking contrast to that of the ancient Greeks. Accordingly, many Eastern art forms have a striking predilection for asymmetry and often avoid all regular or geometrical shapes. The Zen-inspired paintings of China and Japan, often executed in the so-called 'one-corner' style, or the irregular arrangements of flagstones in Japanese gardens, clearly illustrate this aspect of Far Eastern culture. Perhaps, in contrast to the 'Static' symmetry approach, there has always been a 'dynamic' school of thought. The discovery of symmetric patterns in the particle world, too, has led many physicists to believe that these patterns reflect the fundamental laws of nature.

Symmetry, together with geometry, played an important role in Greek science, philosophy and art, where it was identified with beauty, harmony and perfection. Thus the Pythagoreans regarded asymmetric number patterns as the essence of all things: Plato believed that the Atoms of the four elements had the shapes of regular solids, most Greek astronomers thought that the heavenly bodies moved in circles because the circle was the geometrical figure with the highest degree of symmetry.

The proportional scheme of the Parthenon is based on the square, the golden-section rectangles, the root-five rectangle and their diagonals. The Greek Gothic and Renaissance designers felt their way towards the perfection of their forms and proportion, just as the artists of ancient Oriental cultures did or the designers of modern times are doing today. For example, the characteristic line of beauty today is a short parabolic curve and long sweep, straight or almost straight – an extraordinary vigorous line which recurs in

all forms streamlined for speed, as well as many static forms related to modern structures.

In his 'The Modulor', Le Corbusier relates that at an early stage of his career, he became concerned with the whole problem of proportion. He was perturbed by the question, "what is the rule that orders, that connects all things: I am faced with a problem that is geometrical in nature; I am in the very midst of a phenomenon which is visual; I am present at the birth of something with a life of its own. By his claws shall the lion be known. Where is the claw, where is the lion....great disquiet, much searching, many questions."

Le Corbusier's feeling is typical of the moment, when an individual has to jump into the unknown, what we call creation. Proportion, in this sense, is much more than a possible control or regulating mechanism that makes good design easier and bad design more difficult. It is a valid means for bringing about artistic expression even though it operates at a higher level of abstraction. The measurements of Le Corbusier's "Modulor" are related through "Golden Mean" to the dimensions of the human body. He establishes a series of dimensions which are related to the most significant points of the human body by use of the "Golden Mean". He published a diagram showing proportion studies in connection with one of his paintings in his book. Many of his paintings show the use of what he calls the "regulating lines''. Many other painters, including Mondrian and Villon, used the "Golden Section" for dividing their canvas.

After the cracking of Renaissance values, a new vocabulary of forms emerged through the experiments of Modern Art, wherein the geometrical form has been equated with the non-objective or the abstract, for it is "characterized by little or no reference to the appearance of objects in nature". This process of embarkation from nature started by Cezanne finds novel expression in the works of Gris, Picasso and Braque, and the geometry of form and colour

in the works of Seurat, culminating in the world of geometry created in the works of Josef Albers, El Lissitzky, Ben Nicholson, Fritz Glamer, Franz Kupka, etc. But some others sought a freedom from the rigidity of geometry. For example, the circle is squared in the cubist interpretations of German Gothic architecture in the works of Lyonel Feininger and the curves and cubes are refined by Le Corbusier in his still-lifes or in the juggling of cubes by Robert Delaunay, as in his 'Eiffel Tower'. The circle is freed from geometry in the works of Max Ernst, Alexander Calder, Matta and Yves Tanguy, in their anti-cubist, rounded, irregular inorganic forms, instead of the mechanistic, to investigate the interior, secret aspect of nature. The circle is further freed in the works of Jean Arp and Joan Miro. Op art, however, has kept strictly within the sphere of geometry and the mystery of optical illusions.

Piet Mondrian, in seeking the rational in pure plastic perception, Vassily Kandinsky, in seeking the spiritual in art, Paul Klee's thinking eye, in seeking the geometry of visual form and feeling, and Victor Vasarely, achieving spatial sensation through movement in plastic units and colour-light quality, have made immense contributions in qualifying the use of geometry and proportion in their artistic expressions.

Referring to the mainstreams of Oriental traditions in symbolic art, I would like to mention the Sufi, Chinese and the Indian, including Tantric Buddhism. The geometrical patterns of Islamic art reveal to the sensitive eye intrinsic cosmological laws affecting all creation. Their primary function is to lead the mind from the literal and mundane towards the underlying reality. The whole approach is akin to the science of mathematics associated with the Pythagorean traditions.

In Sufi philosophy, spiritual states and stations and presences are detailed orientations expressed through an art form in which the science of number and geometry play the main role. Number is the spiritual image in the human soul resulting from the repetition

of Unity. And it is through geometry that the personality and character of numbers is revealed, providing still another means of experiencing the cosmic processes of nature. The number 1 generates the point, 2 the line, and 3 the triangle which is the first form to enclose space.

The creation of shapes through the use of numbers in geometry as mathematical expression reflect the archetypes through the world of symbols; mathematics thus, as a language of the intellect, is a means of spiritual experience whereby one can move from the sensible to the intelligible world. It is through symbols that one is awakened and transformed, and one expresses.

The symbolism of geometric pattern in mathematical tessellations is generated from the number 1 through the concept of symmetry. Correspondence in size, shape and relative position of the parts to the whole is the ordering principle of fundamental symmetry e.g. bilateral or radial symmetry; both symbolizing the cosmic processes characterized by extension in all directions by boundless and infinite divisibility. These processes are beautifully demonstrated in the arabesque design forms that express rhythm and continual change with the respect for centre, thereby corresponding in visual terms to geometry.

According to Sufis, geometric forms indirectly possess a dual characteristic; the static and the dynamic; the passive and the active aspects that in union create a third form, out of which are born new forms. The triangle, hexagon and square are the forms in arabesque patterns that constitute the expressions of the mystic quest and the inner dimensions in Islamic traditions. Traditional Islamic architecture also captures space through the rhythm and symmetry of geometric forms and the intuitive perception of the laws of harmony which unite all things in the universe.

Whereas one wonders at the ingenuity of the interlacing arabesque patterns, the intricacy of the geometrical application in

the Vedic period and later, in Tantric Buddhism, demonstrates a remarkable magical power of geometric form.

Tantric Buddhism, a science of the dynamics of mind control, talks of levels of consciousness deeper than conceptual thought. When we talk of those levels, words fail; in experiencing them, logical thought is transcended – hence the need for the symbol. The Mandalas, with their symbolic forms and deities, have enabled the Tantric adepts to conjure up, and unite with, the forces for rapid destruction of the ego. The importance of these has been borne out by Jungian psychologists and the users of LSD and mescaline who have encountered, in their own consciousness, not only elaborate but similar abstract symbols according closely to the Tibetan mandalas.

A Tibetan mandala is divided into five sections -- on the four sides of a central image, or symbol, are disposed, at each of the cordinal points, four other images or symbols. The quinary grouping of image and symbols is psychologically significant, indicating the four cordinal points that revolve around a centre-- the five points corresponding to the five structural elements of human personality, centred on the conscious principle, the kernel of the individual, the cause of the Samsara and also of the Return.

There is a unique ordered system of Tibetan iconography and diagrams for the composition of the divinities. Iconometry has been considered the grammar of drawing, the science of mathematical proportions which imparts harmony to an image. Figures constructed according to the specified canons of proportions and the compositional diagrams are outstanding in their expressiveness and perfection of classic forms.

A unique example in architecture is provided in the Buddhist monument at Borobudur – the architectural design of Borobudur invites the pilgrim to undertake the physical effort of a circling climb that has a spiritual purpose. This is a concrete representation of the Buddhist path to Nirvana – an architectural mandala of the

pilgrim's path, an architectural form that has a transformative quality.

The ancient Yinyang symbol of the Chinese Taoists provides a pre-Tantric parallel of the intuitive experiences of the symbolic forms by delving deep within their own consciousness. It leads up to the principle underlying the Tibetan mandala. Though antedating Buddhism, it is in perfect harmony with the Tantric conception of the universe and what it symbolizes has been largely corroborated by modern physicists. It proves the fact that such symbols are not arbitrary creations but arise spontaneously from the depths of consciousness.

More than three thousand years ago, the Chinese used the 'yinyang' diagram to illustrate the emergence of the 'myriad objects' of the universe from a pure, undifferentiated and formless matrix. The circle symbolizes 'Tai Chi' (the Matrix) which is formless and above duality. In the diagram, however, it is manifesting itself as the progenitor of the universe; hence it is divided into yin (the dark) and yang (the light), which signify the negative and positive poles exemplified by all conceivable pairs of opposites – passive and active, female and male, moon and sun, etc. The line dividing the circle is also known as the line of marriage. Each division contains within itself the seed of its opposite – a tiny circle of the other's colour.

If an infinite number of parallel lines are drawn across the circle (symbolized by eight groups of linear configurations in the diagram), the spaces between them would each consist of yin and yang in different proportions, implying that the differences between the structures of all the substances in the universe are determined by proportion and governed by negative and positive in each. This concept of structure (both physical and psychological) has many parallels in modern thought, as for example the concept that no man is wholly male and no woman wholly female.

For the analysis of the potential symbolic value of geometric forms, Hindu art perhaps provides precise substantial evidence of the working principles of such a symbolic form language. It is the transcendental vision in Hindu art which has achieved the miracle of integrating all living forms into geometrical and architectural patterns that are infused with movement, organic vitality and intense expressiveness. Whereas geometry in the West was essentially related to the tangible concepts of space and time, in India it provided an experience of intangible space and infinite time.

A broad analysis of the essential properties of the fundamental geometrical forms and their symbolic significance in traditional arts may be useful to understand how these forms had replaced the naturalistic form in the figuration of divinity or other transcendental concepts.

According to Tantric perceptions, the point, the 'Bindu', can be considered a point-circle not yet having a radius. It can also be thought of as a triangle with no area, a point where the would-be three vertices coincide. In Sri-Chakra the central point represents the principal divinity (viz. the mother-goddess). She is imagined as being seated at the central point ('bindu') on a cot, the four legs of which are the deities responsible for creation of all things. The central point ('bindu') is a union of the ultimate male principle ('purusha') and the ultimate female principle ('prakriti'); the former is the principle of consciousness (Siva) while the latter is energy ('sakti') – a primordial point of cosmic emergence of genesis.

The sphere is a body of perfect cohesion, fullness, and unity determined by a centre equidistant from every point of its circumference. Its energy is centripetal when it is indrawn towards the centre, and centrifugal when it expands towards the circumference. In Greek metaphysics, the sphere represents

universal manifestation, the totality of existence – it is the form of God.

The circle is a line recoiling upon itself and devouring, as it were, its own beginning, eternally revolving around its centre. In Vaisnavism and in Buddhism, the circle in the form of a 'Chakra' (wheel) represents the revolution of Time, the cycle of existence, cosmic or human, the Eternal Law, according to which everything proceeds into manifestation and is again withdrawn from it.

The spheroid can be considered a sphere in the process of pulling itself into two separate units, each with its own centre. It represents division of wholeness for the sake of multiplicity. It, therefore, stands for the World-egg ('Brahmanda'), pregnant with the duality of 'Purusha' and 'Prakriti' which leads to manifestation.

The cube is an entirely inert form – without dynamic stress, firm, rigid and motionless. The cube and square, its correlates, represent, among the 'Tattvas', 'prithvi' (Earth), the grossest and densest element, the stable and solid support of all life. In linking the perfect geometrical bodies and the elements, Kepler also linked the cube with earth.

The cylinder, an eminently dynamic form, is a compact sheaf of parallel energies pushing in both directions along its longitudinal axis into limitless extension. In Buddhism, the vertical cylinder, whether in the form of the 'Dharma-stamba', the Pillar of the Law, or as the stem of the lotus that supports the Buddha in glory, stands for the central axis of the universe. This very conception is expressed in Saivism by the same form, but with a different connotation. Here it is the erect Lingam of unlimited extension which supports the universe. Brahma as a swan flying up into heaven and Vishnu as a bear digging down to the centre of the earth, trying in vain to find its end (or limits).

The spiral, when it coils inwards, suggests the gathering up of forces – recoil, concentration, involution. When it coils outward in

widening circles, it suggests procession, expansion, evolution. The spiral in the form of the 'Sankha' (conch), the 'Salagram' (fossilised shell) and the 'Seshanaga' or 'Ananta' (serpent of eternity) always refers to Vishnu – Narayana, the all-pervading, creative principle. An active movement of the spiral can become transformed into a violent movement as a symbol of hidden activity of the point, such as in the whirling Tandava Dance-Natraja – Lord Siva, where power assumes the shape of spiral frenzy.

Siva's dance – according to A K Coomaraswamy – is the clearest image of the activity of God which any art or religion can boast of. As the god is a personification of Brahman, his activity is that of Brahman's myriad manifestations in the world. The dance of Siva is the dancing universe; the ceaseless flow of energy going through an infinite variety of patterns that melt into one another – an energy dance; a pulsating process of creation and destruction. Modern physics has also revealed that every sub-atomic particle not only performs an energy dance, but it is an energy dance – a controlled rhythm of creation and destruction in the universe.

The triangle, the first of the rectilinear figures to define dimension, has the strongest inner cohesion, for each side is connected with the other two, each is in opposition to, and complementary with, the others – in a balanced tension of unity in plurality. The equilateral triangle standing on its base represents `Purusha', the immanent principle. It is also a symbol of Fire ('Agni') as an upward tending, involuting force, returning to the centre. Standing at its apex, with extension dominating it, represents 'Sakti', 'Maya', the power of manifestation. And when the triangle has one of its sides raised into the third dimension and from a plane figure becomes a body, a tetrahedron, it stands for 'Kriya Sakti', the power of operative manifestation in space and time.

Like the geometrical figures and bodies, lines also have their morphology and meaning. The straight line is direct, rigid, insensitive, dividing space but never forming it, itself speechless and limitless. In Tantric symbolism, the straight line represents 'Jnana-Sakti', the direct perception of pure consciousness ('cit').

The curved line, regardless of the degree of curvature, is always creative, formative; it always delimits or encloses a portion of space and thus originates shape. A curve can be flat or full, relaxed or full of tension. A double curve, bending first in one direction and then in the other, suggests a restless forward movement. In the Tantras, the double curve in the form of the 'ankusa' (elephant-goad) is the symbol of 'Ichcha-Sakti', pregnant with the desire for manifestation.

Surfaces, being only portions of geometrical bodies, necessarily partake of the character of the body to which they belong. A convex surface partaking of the nature of a sphere expresses growth, progression, fullness, expansion, radiation of energy from within. A concave surface, on the contrary, suggests an indrawing of energy, regression, re-absorption and collapse. In a flat surface, these tendencies balance each other.

Directions in space also have their own symbolical meaning. For example, verticality makes for dynamism, aspiration, growth and firmness, while horizontality makes for heaviness, quietness and inertness. An upward diagonal slant has sway, action, aggressiveness, while a downward slant suggests fall, defeat, submission. Vishnu as the supporter of the universe is represented in the form of a vertical column (pillar of the universe), standing rigidly erect, with straightened legs and arms close to the body, holding his four attributes symmetrically on either side and vertically above each other. The geometric basis of the image is a series of parallel vertical lines.

Only in his form as the 'Yoganidra', when at rest between the withdrawal of one universe and the springing forth of the next, is

Vishnu represented as lying horizontally on the coils of 'Sesanaga' floating on the Ocean of 'Pralaya'. His horizontality is combined with a spiral movement of the Naga; he is inactive between involution and evolution.

The Buddha after his enlightenment is represented seated cross-legged in supreme calm, all senses withdrawn, his entire figures inscribed into the upright triangle in a state of tranquility, the symbol of 'Prakasa', the principle of Light.

And just as anatomy is expressed in simile in traditional Indian art, divinity itself is expressed in an analogy of form, character and movement. Such transfigured form language directly touches our inner awareness of cosmic correspondence, for meanings are given to lines and geometrical forms by the perceptive from his own inner experience.

The geometric methods of design have also prevailed over the representational in Hindu Schools of Painting and Sculpture – in the action of the figures, the folds of the drapery, etc, all being worked out on a geometric rather than naturalistic basis. This tendency shows the metaphysical bent of mind. Ms Boner, in her excellent interpretation of the principles of composition in Hindu sculpture (cave temple period) has been governed by three leading ideas. Firstly the sub-stratum – a circular field around a point divided by six, eight or 12 diameters and sub-divided by a number of chords, running parallel to the diameters; secondly, the space division or measure, wherein the diameters intersecting the circle are connected by vertical and horizontal chords. And thirdly, the time sequence where the points of the circle are further connected by chords running parallel to the oblique diameters, creating a network of lines that determine all stresses and movements in the composition. Space division and time sequence, analytically differentiated, appear nevertheless in all compositions intimately interwoven like warp and weft on a loom – one static and the other kinetic. Geometry here provided a plastic experience which,

according to Gyorgy Kepes, is "used to designate the formative quality, the shaping of sensory impression into a unified organic whole".

Some of the symbolic constructions and forms of stunning geometric beauty and power in its pure form include 'Vedis' and the 'Sri Yantra' regarded as 'Chakra-raja' – the King or prince among 'chakras'.

In the Vedic period, certain 'Vedis' and 'Agnis' (raised altars) had to be constructed for the performance of 'Yajnas' (sacrifices). This is described in the Sulba-Sutras, according to which each 'Vedi' or 'Agni' is to be symmetrical about the east-west line called the 'praci' or 'prsthya' (backbone). The construction of these leads to intricate geometrical problems such as how to convert a square into a circle or semi-circle of the same area and vice-versa.

The solutions to these highly interesting problems of how to construct figures of different shapes (squarish, rectangular, circular, trough-shaped, bird-shaped, wheel-shaped, etc) having the same area or, conversely, how to construct figures of the same shape, but having different areas, are given in the Sulba-Sutras.

The great importance of sacrificial altars lies in the fact that their construction provided, on the one hand, a great impetus to the study of geometry, the measurement of areas and to the making of a variety of differently-shaped bricks, half-bricks and quarter-bricks used in the construction of the 'Agnis'. On the other, it supplied the prototypes of later architectural development. The 'stupa' and the Hindu temple with their complex architectural forms signify a high degree of symbolic beauty – for instance, the Kailash Cave temple at Ellora aand the Sun Temple at Konark.

The point, the triangle, the eight-cornered figure, the two ten-edged figures, the fourteen-cornered figure, eight petals, sixteen petals, the three circles and the three 'bhupuras' are beautifully integrated to form Sri Chakra of the Supreme Deity. These nine

forms known as Siva Chakras have their individual names and are potent, inaccessible to the senses, perceived only through meditation. All of them have their own colours – except the 'Bindu' which is beyond the colour scheme and which is, in fact, the origin of this 'mandala'.

The figure of Sri Chakra, the single body of the Siva couple, is a gestalt of both the dynamic and static poises. In its marvellous configuration, there is a certain amount of mobility inherent and innate in immobility and certain poise of immobility apparent in mobility. The interpenetrating triangles symbolise the perfectly balanced interaction of active and receptive principles, contained by the never-ending circle.

It is a peerless Yantric picture of the cosmos to be created by the imagination of man. It at once embodies the twin aspects of potential and actual form and its nine stages of evolution and, conversely, of dissolution.

Its form pattern is a rudimentary diagram of forces (nine in number, four representing the male principles and five the female principles), brought into being through a graphic pattern of interwoven triangles, dimensional relationship and juxtaposed colour. Its visual coherence is related more to our neural and psycho-physiological being than to our intellectual processes. The coherence of the pattern constituting this nine-fold union is difficult to describe. It is known only through experience at various levels of consciousness. The forces or energies of the universe are concentrated in the 'Yantra' and so are the energies of the psychological constitution of the devotee, also centred in the same 'Yantra'. It is a psychocosmogram; a plan of the presented universe and of the perceiving individual.

Today's scientific enquiry describes pyramidical power as the cosmic generator. And India's way of thinking is also getting caught in the grip of science – that each form is a shape produced by the fusion of many vibrations. In other words, the view is

gaining currency that "all forms are actually the result of combination of energy".

Unfortunately, during the last few centuries, we have, under the strong influence of the West, gradually deviated from the traditional approach to adaptation of international art forms and styles. As we know, imitative art has no underlying principles whatsoever; hence there have been no vital contributions to enrich our traditions in art in the real sense. Indian modernity hasn't proved any validity of experience either.

It is only recently that some artists, grouping as Tantrists or neo-Tantrists, have attempted to express themselves in geometric form with a deep concern and feeling, recreating the symbolic significance of geometric form in expressing their metaphysical visions. Their work, however, is too well-known – to all of you – to be enumerated here in any detail. I may add that perpetuation of geometric forms has been observed in its widespread ritualistic applications in 'yajnas', and its decorative-cum-symbolic applications in Kolam, Alpana, Hoi, Mandanas, Rangoli, etc.

Through the ages, then, great significance has been attached to the use of geometric and proportional systems in the Egyptian, Greek and Hindu civilisations, all of which established standards of beauty that expressed in their arts; architecture, sculpture, painting and other ornamental arts, through the symbols of harmonic relations.

Besides the metaphysical significance of geometric figures, the underlying structures in a design, in a sense, provide the same integral strength as the bonal structures of a human body. In turn, the rhythmic links of formal elements in a design may be compared to the bloodstream, its vital movements imparting life, vibrancy and significance to the visual expression.

For, periodic motion, usually known as rhythm and used as a term in the arts as well as in medicine and astronomy, is the foundation of all happenings in the world we know. This has been

sensed from time immemorial. The traditional sources explain the universe in terms of motion just as the Sanskrit 'mantras' explain it in terms of sound. For Hindus as well as Taoists, the universe was a perpetual motion-machine; this cyclical time is symbolised by the figure of the wheel.

The character of 'rhythm', as its implications grew, has become more and more mysterious – nobody has succeeded in analysing it. In truth, no scientific study has gone beyond the elementary forms of regularity encountered in physics and chemistry. But we do feel convinced that it is the 'rhythm' ('prana- shakti', the life-holder, the vibration of cohesion) that constitutes the essence of life and hence also the essence of art – even though it be geometric. An artistic image, therefore, is more than a pleasant tickle of the senses and more than a graph of emotions. The common denominator of artistic expression has been the ordering of a vision into a consistent, complete form – the structure of the form analogous to our thoughts, ideas and visions. In ancient times, religion, art and science were one integrated experience. In the course of time, these became disintegrated, into specialised areas of activity. But in the shape of things to come, these will again have to be a one-fold experience and hopefully, there will be a concentric movement for integration of religion, art and science for a vision of consolidation – a techno-scientific-cultural transformation.

I may quote a saying of Gautam Buddha, "Consciousness may exist having matter as its means, matter as its object, matter as its support and seeking delight it may grow, increase and develop....Consciousness may exist having sensation as its means, perception as its means, or mental formation as its means, mental formations as its objects, mental formations as its support, and seeking delight it may grow, increase and develop...."

Thank you.

Prof PRAN NATH MAGO