

from society—in relation to an existing order as Molière does. They are only interested in him in so far as he is the product of his immediate environment and his feelings conditioned and corrupted by it. The accent should therefore fall on the breadth and variety of Molière's vision of man and society, on his sense of society as a coherent whole, on his fundamental sanity and on that wisdom which belongs peculiarly to the great European masters.

MATILA GHYKA

FROZEN MUSIC

ALTHOUGH the famous comparison of architecture to frozen or petrified music is so frequently repeated, we find its authorship attributed to many different writers: the monk Colonna (author, about A.D. 1500, of the *Hypnerotomachia Polyphili*), Leonardo, Schelling, Novalis, Goethe and Walter Pater. The truth is that Schelling is responsible for the 'frozen music' image, and Goethe, later, for the 'petrified music' one.¹ If we add here Leibniz's statement that 'Music is an exercise of secret arithmetics, and the one who indulges in it does not know that he is dealing with numbers' (letter to Goldbach, April 17th, 1712), and the more recent observation that 'Music is to Time what Geometry is to Space' (Francis Warrain), more succinctly: 'Music is Drawing in Time', we can not only realize that this music-architecture comparison or simile is more than a happy suggestion, but also may place ourselves into the frame of mind most suited for understanding the evolution and present state of Western Architecture.²

The fundamental ideas which controlled its development and evolution are indeed Plato's theory of proportions, itself a direct application to space of the musical theory of intervals (rhythm in space could be made to correspond directly to rhythm in time, because the Greeks in studying the intervals of the diatonic scale

¹ 'Since it (architecture) is music in space, as it were a frozen music . . . ' (F. Schelling, 1775-1854, *Philosophie der Kunst*).

² This term includes the Old World (Egyptian, Iranian, Greek, Roman, Byzantine, Romanesque, Gothic, Renaissance and Baroque schools) minus China and India, and 'post-Columbian' America.

considered the ratios of the actual lengths of the lute strings)¹ and the extension to space of the concept of 'eurhythmy', meaning here the harmonic linking together of the proportions as regards length, surface or volume characterizing a given architectural or decorative composition. All these concepts are, of course, of Pythagorean and Neo-Pythagorean inspiration, correlated to the symphonic, harmonic conception of the Cosmos, of the rhythmic correspondence between World-Soul and individual souls, between Universe, Temple, and human body, later on simplified as correspondence Macrocosmos-Microcosmos; the 'Principle of Analogy', established by Thiersch² as the basic law of Western Art, is already found in the Pythagorean 'Hieros Logos' or Sacred Speech, collected by the direct disciples of the Master of Samos.³

The correspondence between musical and architectural composition, between the linking of rhythms in time and of proportions in space, is explicitly mentioned in Vitruvius and brought into light again by the revival of the Platonic theory of proportions during the first Renaissance (Luca Pacioli, Alberti), revival also of the Pythagorean axiom: 'Everything is arranged according to Numbers.'⁴ This mathematical and 'harmonic'

¹ Whereas we consider the frequencies of their vibrations. But frequencies per second and lengths of musical strings are inversely proportional to each other, so that the two methods are equally legitimate.

² 'We have found in considering the most remarkable architectural productions of all periods that in each of these *one fundamental shape is repeated* so that the parts by their adjustment and disposition reproduce similar figures. Harmony results only from the repetition of the principal figure throughout the subdivisions of the whole.' (*Die Proportion in der Architektur.*)

³ 'You will know, as far as it is allowed to a mortal, that Nature is from all points of view similar to itself.'

The *Macrocosmos-Microcosmos* correspondence dear to Occultists and Rosicrucians, as also the hermetic 'Id quod inferius—Sicut quod superius', are derived from this same ideology.

⁴ The harmonic, symphonic conception of Art and Life was still firmly integrated in the Elizabethan mind:

'There's not the smallest orb which thou behold'st
But in his motion like an angel sings . . .
Such harmony is in immortal souls . . . ' (Shakespeare)

' . . . his voice was propertied
As all the tunèd spheres.'

(*Idem*)

(Footnotes continued on page 189)

point of view reigned without contestation during the first Renaissance, and characterizes later the whole spirit of Baroque Architecture. Incidentally Baroque Architecture (in Rome, Spain, Portugal, Southern Germany) illustrates Spengler's observation that the architecture of a period of civilization is in some way a reflection of its geometry; the spiral, ellipse and sinusoid appear everywhere, whether as controlling shape or as ornament, in Borromini's, Longhena's, Balthazar Neumann's and Churrigerra's buildings, and we can say that a beautiful baroque church is not only 'a metaphysical theatre' (Fechter), but also a repertory of algebraical curves, of 'fluxions' of well-ordered surfaces and volumes.

This predominantly scientific character of Renaissance and Baroque Architecture, the importance given to the theory of Proportions and the 'Theory of Space' (the study of the five regular 'platonic' and the thirteen semi-regular 'archimedian' polyhedra and the interplay of proportions therein), thoroughly developed not only by the architects, but also by painters like Piero della Francesca, Leonardo and Dürer, caused in the seventeenth century the anti-geometric or intuitionist reaction whose manifesto was formulated in France by Perrault⁵; and since then there has been an alternation of pendulum swings, periods during which the 'Theory of Space' and of Proportions, and the necessity of symphonic composition, are forgotten, followed by periods when these laws are rediscovered, and geometric planning comes into favour again. This conflict between planned composition and intuition or inspiration is still going on, not

Also

'Ah, Beauty! Syren, fair enchanting Good, . . .

Still Harmony, whose diapason lies

Within a Brow; . . .'

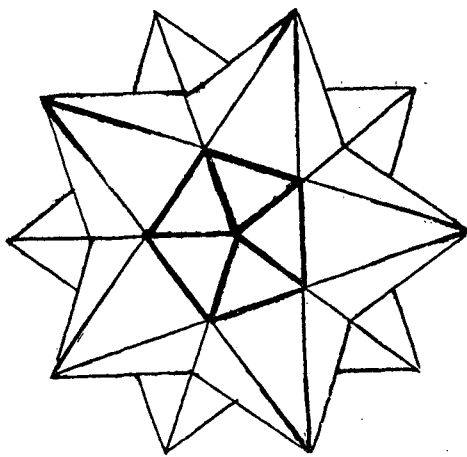
(S. Daniel)

This Pythagorean attitude of mind reasserts itself unexpectedly in Prof. Elton's most interesting essay on 'English Prose Numbers':

'Beauty is Form, and number is one of the constitutive elements of Form, as all things are determined by Number.'

(I apologize for retranslating from my French translation of Prof. Elton's sentence, not having his text at hand.)

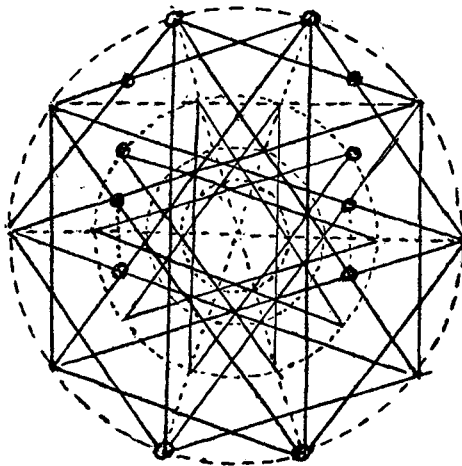
⁵ Here is Perrault's outburst against co-ordinate or harmonic planning: 'The reasons which make us admire beautiful works (of art) have no other foundations than chance and the workers' caprice, as these have not looked for reasons to settle the shape of things, the precision of which is of no importance.'



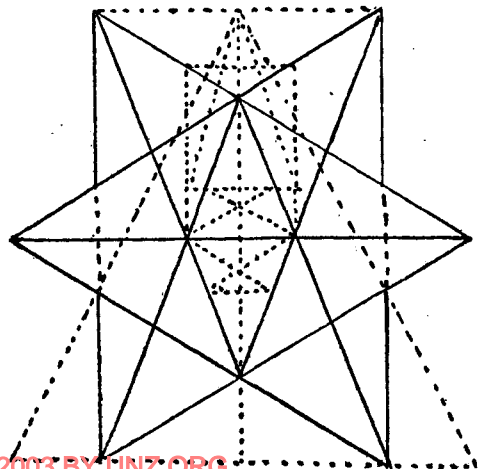
A. Orthogonal projection of
12-pointed star-dodecahedron

A

B. Another projection giving key
of Gothic Master Diagram



B



C. Another, giving key to proportions
of human face and human body

only in the realm of architecture. In connection with poetry, we had not long ago in France the 'Poésie Pure' controversy; here Mallarmé has been the high priest and master of the 'symphonic' school. Correspondence and analogy of sounds, of metaphors, of meanings, are the instruments of his technique, analogy and concatenation of analogies (like for the Pythagoreans and the Greek and Gothic architects) his keys to the visible and invisible world.¹ Of his disciples, Paul Valéry is the most successful; in the opposite, 'inspirationist' camp in French poetry, one could single out the late Countess de Noailles. It is interesting to note that Edgar Allan Poe (in his explanation of 'The Raven'), Walt Whitman and P. Verlaine claim to belong to the school of quasi-mathematically planned composition.²

In our time, or rather in the period between the two World Wars, the concepts of proportion and 'symphonic' planning have, in architecture and decorative art, come into their own again; this revival is due in part to the investigation pursued in different countries about the canons of Greek and Gothic Architecture (F. M. Lund in Norway, Jay Hambridge in the United States, Professor Moessel in Germany) and about the quasi-esoteric transmission of these canons and controlling diagrams through innumerable generations of architects and Master Masons.

We have not the space necessary to show how these independent but convergent investigations have actually given us the key to the master diagrams of Greek and Gothic plans, and proved conclusively their Pythagorean inspiration; we can only mention the part played in those diagrams by the golden section,³ the

¹ Metaphor is the condensed transposition in the realm of images of the geometric proportion (A is to B as C is to D), the *analogia* of Vitruvius.

² Verlaine writes:

'Nous qui ciselons les mots comme des coupes
Et qui faisons des vers émus très froidement.'

Also (in a letter quoted by H. Mondor in *Verlaine et Mallarmé*): 'Une autre guitare qu'il serait temps aussi de reléguer parmi les vieilles lunes . . . c'est l'Inspiration—ce tréteau!—et les Inspirés—ces charlatans!'

³ The golden section (*extreme and mean ratio* of Euclid) is the most remarkable asymmetrical way of dividing a line (or any measurable thing, surface, volume, weight, etc.) in two parts, such that the largest is to the smallest as the whole is to the largest. This ratio is the leading proportion in the pentagon, the pentagram (star-pentagon) and the correlated decagons, and (in space) in the dodecahedron, icosahedron and the two star-dodecahedrons obtained by prolonging the sides or surfaces of dodecahedron and icosahedron.

pentagram (secret pass sign of the Pythagorean brotherhood, symbol of health, harmony and love, and geometrical representation of a 'nest' of golden sections), the decagon and star-decagons, the dodecahedron (the fifth regular body, quoted by Plato in the *Timæus* as symbol of the harmony of the Universe, also development of the pentagon in three dimensions) and the 12-pointed star-dodecahedron (development in three dimensions of the star-pentagon or pentagram; its projections in the plane give us the key, not only of the principal Gothic master diagram, but also of the ideal Greek canon of proportions for the human body).

Concurrently with these discoveries in Æsthetical Archæology, another group of investigators, trying to bring forth the mathematical laws of biological and crystalline morphology and growth, reached parallel conclusions about the importance of the golden section in biology, specially as regards the human body and plants, bringing thus an unexpected confirmation to the speculations of the Pythagorean and Platonic Schools, to the cryptic Vitruvian allusions to the correlation between the temple and the human body, etc.¹

Whilst the mathematical laws governing living shapes and living growth were thus shown to fit in curiously with the theories and patterns of Greek and Gothic Æsthetics discovered by the archæological line of investigation, still a third school of thought and research contributed to the revival of Mathematical Æsthetics. This was a consequence of the reaction against the sterility of nineteenth-century architecture with (on the Continent especially) its blind copying and mixing of Renaissance

¹ The most important books in this line of research were published in England: *The Curves of Life*, by Sir Th. Cook; *Growth and Form*, by Prof. D'Arcy Thomson; *Lectures on the Principle of Symmetry*, by F. M. Jaeger. To quote Jaeger:

'A certain preference for the pentagonal symmetry, in the case of animals as well as of plants, appears to exist here, symmetry clearly linked to the important proportion of the "golden section" and unknown in the world of inanimate matter.'

The pentagon, the dodecahedron and the golden section, which play such a part in the morphology of living systems and in living growth, never appear in inorganic geometrical configurations (crystals), where only symmetries based on the triangle, the square and the hexagon are shown. The mathematical explanation for this is quite simple and based on the angular conditions for homogeneous equipartition in space.

or Louis XVI 'clichés', reaction which found its strongest expression in Le Corbusier's lashing statements.¹ The battle-cry of this new 'functionalist' school is Le Corbusier's untranslatable 'la maison est une machine à habiter', the argument, Sullivan's 'Form follows Function', the justification and programme, Sir Walter Armstrong's 'Beauty is Fitness expressed'.

The result of the *functionalist* attitude was to bring back to architecture not only the 'Theory of Space', the science of pure volume, but also the science of stresses; engineer and architect joined hands,² and here too the dynamics of the living growth in animals and plants were shown to fit in with those of human buildings; shyly first, artists began to admit that in some productions of this collaboration, American silos and factories, could be found the abstract beauty of Byzantine or Romanesque volumes, that the Golden Gate Bridges could give the same æsthetic impression of superbly balanced stresses as a Gothic cathedral.

The architect must, of course, retain the supreme control, impart to his creation the organic unity³ without which it cannot be considered as a work of art. Le Corbusier himself found that the functionalist conditions allow the architect a certain freedom in the disposition of his structural elements, and rediscovered the eternal value of the proportion, of the interplay of proportions within an organic design. He rediscovered also the usefulness of the golden section as a 'regulating theme', as shown in his plan for the projected 'Mundaneum' (World Centre of Studies and Artistic and Scientific Co-ordination in Geneva) and

¹ *Vers une Architecture*, etc.

'L'architecture n'a rien à voir avec les styles . . .'

'Les architectes de ce temps, perdus dans les "pochés" stériles de leurs plans, les rinceaux, les pilastres ou les façades de plomb, n'ont pas acquis la conception des volumes primaires. On ne leur a jamais appris cela à l'école des Beaux-Arts.'

'Les architectes ont aujourd'hui peur de la géométrie des surfaces.'

'L'architecture est le jeu savant, correct et magnifique des volumes assemblés sous la lumière.'

² To quote again Le Corbusier:

'L'ingénieur, inspiré par la loi d'économie et conduit par la calcul nous met en accord avec les lois de l'Univers.'

'Assujettis aux strictes obligations d'un programme impératif, les ingénieurs emploient les génératrices et les accusatrices des formes. Ils créent des faits plastiques limpides et impressionnants.' (*Vers une Architecture*.)

³ 'Art is the power of creating living organisms, out of stone, clay, colours, tones, words.' (Schumacher, *Handbuch der Architektur*.)

for his villa at Garches. Perfume manufacturers enclosed their wares in Platonic or Archimedian polyhedra; goldsmiths and jewellers in Paris and New York used Hambidge's and Moessel's dynamic symmetry and harmonic division of the circle for the design of their cups and jewels.

Let us here quote Claud Bragdon, an American representative of what we may call the humanistic-functionalist school of architecture, which superimposes a 'symphonic' point of view over the engineer's scheme of volumes and stresses:

'The architectural designer should master the principles of Dynamic Symmetry (the name, taken from Plato's *Theaetetus*, given by J. Hambidge to the science of 'commodulating' surfaces and volumes) in the same spirit that a composer of music learns harmony as a useful and necessary part of his equipment for self-expression'.

Also:

'A work of architecture may be significant, organic, dramatic, but it will fail to be a work of art unless it be also *schematic*. It means (this word) a systematic disposition of parts according to some co-ordinating principle.'

And finally, in order to conclude, as we have opened, on Schelling's useful analogy:

'If a work of architecture is "frozen music", it is so only by reason of a harmonious relation subsisting between its various parts—otherwise it is only frozen noise.'

BASIL JONZEN

A VISIT TO MR. SICKERT AT BROADSTAIRS

INVITATION to lunch with Sickert, the painter of Venice, Dieppe and Camden Town, that great veteran English Artist of Sunday ennui, music halls and iron bedsteads.

Four of us had been invited to visit him next Sunday at his house near Broadstairs.

He had even promised to meet our train. What hospitality from an old man. Our cup of anticipation was running over.