The number and its symbolism in ancient Greece

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ABSTRACT

The symbols are of particular importance. They are the heart of the creative life; rather they are its core. They reveal the secrets of the unconscious mind open to the unknown and the infinite. While talking or gestures while express, we use the symbols, noting it or not. All spiritual science, all art and all art techniques encounter on their way symbols. History confirms that the symbols of each object can be obtained symbolic value, whether natural (rocks, trees, animals, planets, fire, lightning, etc...) or abstract (geometrical shape, number, pace, ideas, etc...). The use of numbers as symbols is as old as language itself, but one that precedes writing, which symbolize numbers (that is, where the reality behind the external characters). The sheer numbers and their symbolism in ancient Greece and is closely associated with the philosophy and mathematics (namely arithmetic). They summarize their view of the world and everything around them. This paper draws attention to the symbolism of the numbers that were in ancient Greece.

Introduction

Symbol can not be defined. It is in the nature to break the solid framework and combines extremes into a single vision. In fact, one can say that the symbols reveal hiding and revealing hidden. Can be understood as a material or abstract signs or indicate a concept or remind him. They are something that represents something else association, resemblance, or convention. They can also be understood as a physical object used to indicate something invisible. The word comes from the Latin *Symbolum* meaning to sign or symbol, which is derived from the Greek *sumballein* (awareness, compare). It can be said that the symbol is different from the ordinary character - he brings a large imaginary parts, archetypes, myths and structures [1].

The use of numbers as symbols is as old as language itself, but one that precedes writing, which symbolize numbers (that is, where the reality behind the external characters). There is no way to prove this remarkable statement, except perhaps to refer to the opinions of older and wiser. The symbolism of the numbers is not only an expression of quantity, but also the idea - each with its own specific characteristics. The sheer numbers that we use to compute the more than for what they believe, at the same time, they are mythological elements (the Pythagoreans, they were even more divine).

Numbers throughout the ages have different meanings and interpretations. Their symbolism runs through the Bible, Torah, Cabbala, etc... The numbers are always attracted man's attention and were generally tied to mysticism or occultism. The role of the number in the history of human thought and civilization in general very complex and beyond the scope of mathematics itself, ways in which the number of disseminated throughout history, which is dropped in the arts, science, magic, sometimes in everyday life are clear and often hidden [3].

The sheer numbers and their symbolism in ancient Greece and is closely associated with the philosophy and mathematics (namely arithmetic). They summarize their view of the world and everything around them.

Pythagoras is an abstract notion of numbers away from its practical use. Plato in his theory relies on the idea of a Pythagorean teaching. Greeks can be seen as people who have looked at a higher spiritual reality of the material world. Specifically, these are emptied into a mathematical system, or a system of proportions. Dealt with the observation of the visible universe and finding the harmonic relations and laws, the sheer numbers of them are represented deities governing the world [2].

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Pythagoreans in Greece, substituting numbers geometrically arranged groups of points; we have developed the discipline of figurative numbers that allowed them to just sort out the connection between numbers and geometric figures in the plane and space.

The Pythagoreans *adored* numbers. Aristotle, in his *Metaphysica,* sums up the Pythagorean's attitude towards numbers.

"The (Pythagoreans were) ... the first to take up mathematics ... (and) thought its principles were the principles of all things. Since, of these principles, numbers ... are the first, ... in numbers they seemed to see many resemblances to things that exist ... more than [just] air, fire and earth and water, (but things such as) justice, soul, reason, opportunity ..."

The Pythagoreans knew just the positive whole numbers. Zero, negative numbers, and irrational numbers didn't exist in their system.

The Pythagoreans represented numbers by patterns of dots, probably a result of arranging pebbles into patterns. The resulting *figures* have given us the present word *figures*. Thus 9 pebbles can be arranged into 3 rows with 3 pebbles per row, forming a square. Similarly, 10 pebbles can be arranged into four rows, containing 1, 2, 3, and 4 pebbles per row, forming a triangle. From these they derived relationships between numbers. For example, noting that a square number can be subdivided by a diagonal line into two triangular numbers, we can say that a square number is always the sum of two triangular numbers. Thus the square number 25 is the sum of the triangular number 10 and the triangular number 15 [11].

One particular triangular number that they especially liked was the number ten. It was called a *Tetractys,* meaning a set of four things, a word attributed to the Greek Mathematician and astronomer Theon (c. 100 CE). The Pythagoreans identified ten such sets.

Numbers	**1**	**2**	**3**	**4**
Magnitudes	point	line	surface	solid
Elements	fire	air	water	earth
Figures	pyramid	octahedron	icosahedron	cube
Living Things	seed	growth in length	in breadth	in thickness
Societies	man	village	city	nation
Faculties	reason	knowledge	opinion	sensation
Seasons	spring	summer	autumn	winter
Ages of a Person	infancy	youth	adulthood	old age
Parts of living things	body		three parts of the soul	

Table 1: Ten Sets of Four Things

Pythagorean discipline figurative numbers (represented by sets of points that correspond to and homothetic, gnomonic growth of geometric figures) enabled the Greeks to observe how each issue, despite the uniform mode of formation, contains features that generally differ from all others. It's really important, and it shows, but at the first integers 2, 3, 4, 5, to add to the number 1 each time completely change the

properties of numbers, adding new individual in the society of numbers. This applies equally to clean, as well as scientific numbers.

The harmony of numbers, and the cosmos

The concept of number that governs the universe as it was introduced by Pythagoras, Plato took over. It is observed that the number of archetypal ideas of Plato added-forms, since the numbers reflect the geometric figures. The number and beauty were the main archetypes (absolute beauty of the Feast), but the very beauty and cosmic harmony subordinate to the government and that the number of organic and inorganic world. Plato drag archetype, which he himself out of the number, it is proportion. The word cosmos, which was introduced by Pythagoras and that already includes the idea of the number (s) well-ordered universe, and the concept of harmony with him in the ancient sense of the word symmetrically connected, dominated not only Plato's cosmology and aesthetics, but also Greek architecture, whose guiding idea cryptic hints Vitruvius. According to Aristotle, the Pythagoreans were revered as the first principle of all things, probably due to their discovery that the principles of musical harmony can be explained by mathematics. In the same passage Aristotle informs us that some Pythagoreans believed that numbers generation, as well as the cosmos itself, can be explained by the Table of opposites, which consists of the following pairs: (1) limited and unlimited, (2) is odd and steam, (3) unity and plurality, and (4) to the right and to the left, (5) male and female, (6) rest and motion, (7) right and wrong, (8) Light and darkness, (9) good and evil (10) square and rectangular [5].

Music and number

Perhaps the study of proportion Pythagoras to music reduced to a number. One day, as he passed the blacksmith, he was drawn to the regular intervals of musical sounds coming from the anvil. Having discovered that the hammers of different weights concluded that the tones depend on the numerical relationships in one of the few experiments took two strings of equal thickness and equal tension and found that, if one is twice longer than the other, when they twitched, gave an octave. If one was one and a half times longer than the other, gave the perfect fifth (do, sol), and if one was a third longer than the other, gave the neighborhood (do, fa). From this we can conclude that Pythagoras found and the diatonic scale.

Pythagorean mathematics, and in particular the theory of proportion which is then developed by Plato, the result of a study of musical intervals. Greeks are comparing the frequency of flashing wire, but their length. The theory of musical intervals and their ratio could also be transferred directly to the study of the proportion of any linear size. Here he meets and the Key, and one of the reasons for its importance - the fact that the progression 1, 2, 3, 4 provides a major scale interval of the diatonic scale, one of the 4-to-2 or 2 to 1 octave 3 to 2 fifths as and that of 4-to-3 fourth.

Quoting Aristotle again ... *"[the Pythagoreans] saw that the ... ratios of musical scales were expressible in numbers [and that] ... all things seemed to be modeled on numbers, and numbers seemed to be the first things in the whole of nature, they supposed the elements of number to be the elements of all things, and the whole heaven to be a musical scale and a number."* [11]

Correlation proportional system of Greek architecture and art

The basic concept of proportion in classical tradition is based on the ratio of three numbers that form the evidence of $a:b = b:c = c:d$, ie. constant ratio which is the ratio of each member according to the following constant. Plato this proportion, the next Pythagorean thought put into the organization of the cosmos, which certainly indicates its primacy over other proportional systems that are in place in antiquity. Euclid basic concept of proportion as determined by the relationship "is a quantitative comparison between two quantities of the same kind." By anyone there is a difference between the ratio and proportion, so the ratio relationship between two terms, a ratio is a combination of at least two relationships, so you need to have at least three terms in order to establish proportion. Vitruvius proportions seen as "matching a certain part of the individual parts of the building and with the whole", and from it arises as a symmetry term that refers to the entire composition. This breakdown suggests concepts and Plotinus to point out that "sense of

harmony should be measured numbers and not in every respect, but the one that would serve to create a form so that the government" [9].

If it is accepted that the term implied proportions correctly measuring parts of a whole, further analysis should follow all possible numerical circuits in such cases form a solid framework, which, it was thought, its internal relations lead to the establishment of harmony, regardless of whether these circuits are based on a strict mathematical definition, the ancient theories of musical harmonies, or other rules, and a number of examples of constant, the numerical relationships.

Strong influence on the arithmetic theory of harmony led to a special way of expressing proportional system of numerical sequences, i.e. a progression [5]. This way of expressing the proportion may be based on more complex systems, but it is already calculated range could be applied without knowing mathematical formulas that preceded it. However, what this way of expressing the proportion of suspicion is the application of complex geometric scheme of the possible process of proportion in architecture and art.

The very proportions, according to the Euclidean definition of "equivalence of two proportions", analogical relationship between the two comparisons when the equality of two algebraic equivalence scale, we have $\frac{A}{B}=\frac{C}{D}$ and $\frac{a}{b}=\frac{c}{d}$ that if a, b, c, d numbers, which measure the size of A, B, C and D are the same unit.

If two (internal) members equal, we get a constant geometric ratio $\frac{a}{b}=\frac{b}{c}$, where b is the geometric mean between two members at the beginning and the end of the numbers. The idea of harmonic connection between the two elements of the formula or thought has a special role in Plato [4].

The geometric proportions can have any number of members:

- Breaking proportions $\frac{a}{b}=\frac{c}{d}=\frac{e}{f}=\frac{g}{h}=$ . . . and so on;
- Constant proportion $\frac{a}{b}=\frac{b}{c}=\frac{c}{d}=\frac{d}{e}=$ . . . and so on.

Greeks felt better about the constant ratio set out in the form of geometric progression a, b, c, d, e, and so on, (such as 1, 2, 4, 8, 16, etc.). Pythagoreans in Sicily had been built three major types of proportions, which may symbolize the algebraic:

$\frac{c-b}{b-a}=\frac{c}{c}$ (1,2,3) Arithmetical proportion;
$\frac{c-b}{b-a}=\frac{c}{b}$ (1,2,4) Geometric proportions;
$\frac{c-b}{b-a}=\frac{c}{a}$ (2,3,6) Harmonic proportions.

The harmonic ratio occurs in music, and geometric - Vitruvius analogies the basis of geometric similarity - dominates the visual arts, especially architecture. The three main types of proportions were known to the Pythagoreans of the Crotona period, and you probably Plato learned from Archytas of Tarentum at the time of his first visit to the Greek.

Two kinds of proportions were Pythagoreans were especially dear [6]. One universal proportions - a group of four numbers as a summary of the three main types of music and reflection of the Key, and the other is the golden ratio or divine proportion.

Universal proportions was complex progression 6, 8, 9 and 12 She has a very important additional feature that through scale among its members provide a Pythagorean intervals of the scale, in fact, the same one that gives the Key. Attracted disciples of Pythagoras, because it has the geometric form 6 presents the number of the cube, 8 vertices of a cube, 12 cubes of edge. For 9 was enough that the square of the first masculine number.

Construction of divine proportions (the golden section) was the best-kept secret mathematical Pythagorean brotherhood. This is actually the most logical way to some measurable asymmetrically divided into two unequal parts, so that the relationship between the greater and lesser offenses is the ratio of the sum of their (whole) and more. If B is a point that divides along the AC so that $AB = a, BC = b$, then, by the

definition $\frac{a}{b} = \frac{a+b}{a}$, it is in fact a geometrical proportion. The Greeks incorporating a proportion of buildings (or rather temples), and gave them just a symbolic character [7].

Aesthetics and numbers

Vitruvius itself includes the concept of symmetry in the system of proportion. Relations, namely proportions were presented numerical values expressed as mean values of prime numbers. This mutual effect of internal control monument and establish the type of network that adapts to the arithmetic and geometric rules. These are the proportions that create symmetry within the meaning of the Greek authors.

And mathematical structure presented edifice is based on numerical factors. Entire significance of this system is based on the values that the Pythagoreans gave the numbers. For Pythagoras numbers are expression of the basic language and vocabulary that connects people and gods. Number one wills all things. It represents the eternal nature of reality. This is what permeates the work with its beauty and perfection. Awareness of the ancient numbers represent *numen* (strength, power, majesty) of the divine. For Plato, to who I was very much Pythagoras, "number is the highest level of knowledge". New-Pythagorean anyone in Gerasene claimed that "everything is determined by the numbers". Therefore, the numbers have been studied as a unit expressing the eternal Truth [2, 8].

For the Pythagoreans numbers are intended as a surface, forms and periods. Construction based on a series of evenly spaced points, making a homogeneous group, formulated with the help of the triangle (gnomon). This instrument, more specifically a tool that makes it possible to draw shapes and figures, reveals a deep connection between the architects and the Pythagorean mathematician. Thus, the triangle symbol master-builder.

Count with Greek numbers

The ancient Greeks originally had a number system like the Romans, but in the 4th century BC, they started using this system. It was a number system closer to Arabic numbers (our own number system). Instead of counting I, II, III like the Egyptians or the Romans, they had different symbols for 1, 2, 3 up to 9, just like us. However, they did not use the same symbols to represent numbers greater than 9. They had a new set of symbols for 10, 20, 30, and so on, and yet another set for 100, 200, 300… This has the disadvantage, like so many of the ancient counting systems that you eventually ran out of symbols!

The symbols that the Greeks used were their letters. They are listed below with their sounds. Unfortunately, this method of counting needs 27 letters, and there were only 24 in the Classical Greek alphabet. This meant that the Greeks had to find 3 extra symbols for the missing numbers of 6, 90 and 900. They used 3 archaic letters, which used to be in the alphabet but had been dropped as they were no longer required [11].

Arabic number	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Greek number	α	β	γ	δ	ε	Ϝ	ζ	η	θ
Greek name	alpha	beta	gamma	delta	epsilon	digamma	zeta	eta	theta
Sound	a	b	g	d	short e		z	long e	th
Arabic number	10	20	30	40	50	60	70	80	90
Greek number	ι	κ	λ	μ	ν	ξ	ο	π	ϙ
Greek name	iota	kappa	lambda	mu	nu	xi	omicron	pi	koppa
Sound	i	k/c	l	m	n	x	short o	p	
Arabic number	100	200	300	400	500	600	700	800	900
Greek number	ρ	σ	τ	υ	ϕ	χ	ψ	ω	ϡ
Greek name	rho	sigma	tau	upsilon	phi	chi	psi	omega	sampi
Sound	r	s	t	u	f/ph	ch	ps	long o	

Table 2: The Greeks did not have a zero. They didn't need one. If you don't have any tens value, then you don't use one of the tens letters.

Conclusion

People have always loved and followed the symbolism of numbers. Based on the symbolism they tried to uncover things and events outside of space and time, based on number of predicted events and happenings, sometimes successfully, sometimes unsuccessfully [12].

In addition to the usual administrative and scientific importance, each number has symbolic things. For Plato is just the interpretation of the symbolism of numbers was the highest level of knowledge of the cosmic and inner harmony. Throughout history, a number of thinkers from Pythagoras and to Kant, the numbers do not approach in a quantitative rather than a qualitative manner. They are in this context, our link with the eternal truths, and their understanding of the condition for the release of vulnerability to fate.

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