

The Significance of Mathematics in Pythagoreanism

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Although Pythagorean mathematics bears little resemblance to what we find in today's textbooks, its foundation was laid by ancient lovers of wisdom. By rediscovering its original significance, mathematics might guide our minds not toward engineering aimed at mastering nature, but toward contemplation, preparing us for deeper contact with the realm of spirit and its magnificent, immortal King—God.

After the publication of my essay titled “Euclid's Geometry Seen Through the Glasses of Saint Augustine,” several readers asked me to translate the excellent volume by the Armenian-Romanian classicist Aram Frenkian (1898–1964), titled *Le postulat chez Euclide et chez les modernes* (1940). It thus became clear to me that his commentary on the significance of Euclid's postulate, in particular, and mathematics, in general, had sparked notable interest. This realization, along with a re-reading of Stratford Caldecott's (1953–2014) excellent monograph *Beauty for Truth's Sake: On the Re-enchantment of Education* (2009), prompted me to write this essay to clarify how the ancient Pythagoreans, and later their (neo-)Platonic successors, understood mathematics.



I have chosen the format of an essay for a simple reason: the sources of Pythagorean thought, as with most pre-Socratic thinkers, do not allow for the reconstruction of Pythagoras's doctrine (c. 570–c. 495 BC) with a significant degree of accuracy. In other words, no matter how honestly we attempt a strictly historical approach, it inevitably depends on how we interpret obscure fragments and uncertain sources. Thus, inevitably, our own perspective on the vision of the ancients must prevail.

The understanding I have reached is based on both Aram Frenkian's essay and the works of those few authors—such as Anton Dumitriu—who have attributed entirely different meanings to mathematics than the quantitative-mechanistic interpretations developed from Descartes onward. I will follow what I hope is a rigorous structure, aiming to paint a clear picture of a context—the Pythagorean-Platonic one—very different from what we understand today as ‘school.’ Let us begin at the beginning.

True *Philosophia* (Φιλο-σοφία)

Although the word designating the art of love for wisdom—φιλοσοφία (philosophía)—is of Greek origin, the discipline it signifies knows no ethnic or national boundaries. Wise men (σοφοί) have existed everywhere, and their efforts were the result of humanity's deepest longing: to escape the curse of death. They understood that resolving this dire situation essentially depended on Wisdom (σοφία), which, according to Pythagoras, belongs only to God. It is not a fleeting, human wisdom (= 'skill') that teaches how to build a house, a ship, or a temple but an eternal and divine wisdom—a kind of 'philosopher's stone'—that can, in a mysterious way, transform a mortal nature into an immortal one. What true sages sought was precisely such a transformation, a mutation that would free them from the sting of death. This is evidenced by their 'paranormal' qualities, which placed them either within the shamanic paradigm of "travelers to the other-world" or in the realm of miracle workers and magicians who defied nature through extraordinary capacities. With his legendary abilities recorded in tradition, Pythagoras is, of course, one of these chosen ones.

His extraordinary capacities demonstrate progress along the path of divine Wisdom, which, once attained, brings significant transformations to those influenced by it. Put simply, these transformations signify a person's becoming a true diver—or, if you prefer, a cosmonaut. The modifications to their epistemological apparatus enable them to ascend from the depths of the sea in which we live submerged (as Plato and Saint Maximus the Confessor describe the current state of fallen human nature) or, in aerial terms, to ascend to that "supra-celestial place" (ὑπερουράνιον τόπον) Plato speaks of in the *Phaedrus* (247 sq.). But how is such an endowment possible? How can one navigate underwater without a diving suit or among the stars without astronomical gear? Obviously, these are metaphors for the faculties the intellect must acquire to follow the paths of love for Wisdom. The essence of this art lies in contemplation, or what Pierre Hadot, following Saint Ignatius of Loyola, called "spiritual exercises."

Immersed in the Ocean of Becoming

To understand the significance of mathematics for the Pythagoreans and Platonists, one must first correctly grasp their view of humanity's fallen state. Although they had no explicit doctrine of "original sin" (or perhaps they did, but the data has not reached us), they were nonetheless profoundly aware of the severely impaired condition of human nature. This was evident to them through the stark deficiencies of human existence: illness, aging, and death. Descriptions of the state of human nature abound: as beings who, instead of living at the water's surface, exist submerged in the abyssal depths (*Phaedo* 109 sq.), or as prisoners chained at the bottom of a cave, watching the shadows of true things outside. The latter description aligns with the Orphic-Pythagorean tradition that views the mortal body as the soul's tomb. It is the cave in which we are imprisoned—not because humanity was ever a non-corporeal being like angels but because the nature of the body with which we were endowed has undergone a profound transformation due to original sin.

Regardless of the metaphors the sages employed, they convey one message: we are in deep trouble because, in our current state, we remain unaware of the terrible ignorance enveloping humanity, like a thick, dark cloud blocking the light. As the Gospel of John states, we are submerged in darkness and the shadow of death. Philosophers, or “lovers of (divine) wisdom,” are those who have sought a way out of this condition. Their reflections have helped me reconstruct the understanding that guided their lives and meditations.

Humanity’s fallen state is tied to a severe distortion of its cognitive faculties. While we retain the ability to reason—albeit with difficulty—that God exists and that we possess an immortal soul, we have lost the ability to perceive the invisible world and its influence on our own. This capacity is what we forfeited.

Immersed in the waves of becoming, we are lost in the labyrinth of the transient world, groping in darkness. Observing the world around us, we encounter a wealth of things, creatures, and objects that tell us little. Some exhibit a degree of order and harmony, while others seem scattered chaotically—like wildflowers or weeds on a field. Regardless, we face a deluge of sensory experiences that can leave us confused. Yet, as we all know, humans do not tolerate confusion and disorder. Instinctively, we strive for visible order, whether in arranging our domestic spaces or organizing the cities we inhabit. One of the most effective means of introducing order into our surroundings is tied to a key concept: number.

Do Numbers Exist?

Those familiar with Plato’s philosophy know how much trouble this abstract entity caused the Athenian philosopher and his disciples. Aram Frenkian also discussed the intermediary state—between unseen essences and tangible things—that numbers occupied in Platonism. To begin, let me make a bold assertion meant to bring us closer to the Pythagorean understanding of mathematics: ontologically speaking, *numbers do not exist*. More specifically, they lack substance and essence (or “ideas”). Numbers are fleeting, illusory entities.

What I say here directly contradicts certain claims by Aristotle, who, in his *Metaphysics*, presented the Pythagorean doctrine as if numbers were conceived similarly to Plato’s ‘ideas.’ Personally, as with other issues regarding the Presocratics, I believe Aristotle was mistaken. But since my aim is not to produce a historical study of thought—which, most likely, would lead nowhere—I will proceed to lay out my working hypothesis.

Let us assume we have in front of us three seemingly identical pencils. I actually have these objects on my desk right now. Being new and part of the same set, they are the same size and color. At first glance, they appear identical. On closer inspection, they reveal differences: one has a mark, another is slightly scratched, and so on.

Nevertheless, I unhesitatingly stated from the outset that there are “3” of them. Upon reflection, my words altered the nature of the objects. For I declared that their plurality is

reduced to only one entity – ‘3.’ I thus applied to my sensory experience, which showed me three (apparently) identical objects, an entity—the number 3—that was not present in my visual field but only in my mind.

This is a difficult point to articulate. I repeat: although the pencils are practically distinct, I noticed a certain similarity among them that led me to affirm they belong under the same umbrella category—the number ‘3.’ In this specific case, the objects are subsumed under a fourth ‘thing’ (shall we call it an ‘object’?) that we commonly refer to as a ‘number.’

Where is the Number?

Here begins the most intriguing part: where is this number—‘3’ in the case of the pencils on my desk—that is attributed to them? While the pencils can be concretely observed, the number itself is nowhere visible—until I represent it on paper. Otherwise, it has no existence. Let us consider another example. I can measure the notebook on my desk with a ruler. Doing so, I find the notebook is 12 centimeters long. Thus, using the ruler, I attribute to the notebook the length of 12. Why not 16? Or 1234? Or any other unit—say, in inches (~4.72)? Because here in Europe, a standard—the meter—exists in Paris as a reference for all measurements. Yet, except for objects we say have a certain dimension, we never actually see those 12 (or XII?) centimeters with the naked eye—except as written signs. The object we call a ‘notebook’ exists, but the number 12 manifests itself only abstractly—it cannot be seen, touched, or sensed.

Setting aside examples, we return to the question that troubled the Platonists: what are numbers? Do they have any form of existence—perhaps only an ideal, intellectual, or mental one? The short answer is “no, numbers do not exist.” The longer answer is more nuanced: numbers possess a type of existence that can be described analogically using the Aristotelian-Thomistic concept of an “accidental form” (emphasis on *analogically*).

Numbers are projections of our minds, which somehow unify the diverse reality around us by invoking these abstract entities that exist only in our intellects. The numbers we apply to the surrounding reality form an intermediary stage between sensory knowledge and the contemplation of the essences of things. Unlike numbers, the latter—substantial forms—are the foundational principles of all that exists in our world. To clarify the distinction between substantial forms and accidental forms, I will propose another example.

Substantial and Accidental Forms

The three pencils in the first example rest on the desk where I am writing this text. If I reflect on the desk itself rather than the pencils, I understand it as an artifact based on an accidental form—the design of the desk in the carpenter’s mind—underpinned by a substantial form, which Aristotle might call the “material cause” of the desk: the wood from which it is made. Wood is not created by us; it is merely processed from trees—vegetative beings whose essence is directly created by God and perpetuated through organic multiplication. The boards and, ultimately, the desk itself are obtained by applying

tools to the tree, enabling the carpenter to materialize the desk's design in his mind. The tools used, the object obtained—all are rooted in accidental forms grafted onto the substantial form of the tree, whose wood permits us to achieve the desired object.

The desk, however, is necessary only in our fallen world. In Eden, had Adam and Eve not sinned, they would not have needed desks, chairs, or even food as we consume it today. Why this is so, I will explain in another essay.

Returning to the original discussion, the desk results from the interplay between a substantial form, processed according to a plan that generates, in the end, an accidental form—the desk itself—useful to fallen humanity in its current condition. Similarly, numbers allow us to order the surrounding world by perceiving a unity in what we observe. For example, the three writing tools we call 'pencils' fall under the umbrella of a single abstract concept, the number '3.' (Although, here I must tell you, even the word 'pencil' actually indicates an 'accidental form' that is the result of human intervention on the 'substantial forms'—the wood, the graphite—from which these objects are made.) Or consider the 27 migratory birds that passed across the sky in front of the window of my house in San Donà di Piave; they are 'unified' under the umbrella of a single number—'27.' This represents a small but important step toward the contemplation of essences. For to achieve intellectual contemplation, the recognition of hypothetical numerical patterns had an absolutely necessary preparatory function. This is why mathematics was so important to the Pythagoreans, Platonists, and Neoplatonists. Let us delve a bit deeper into this subject.

The Role of Mathematics in Understanding Reality

In the ordinary course of life, we are overwhelmed by the experience of the world around us. Yet, the human mind constantly seeks to recover—or discover—or perhaps impose—order within apparent chaos. This arises, of course, from the rupture between the paradisiacal world before the Fall, a world well-ordered and suffused with perpetual beauty, and our fallen world immersed in the darkness of death—where beauty is only occasionally seen, and goodness and truth are recognized with great difficulty.

God's revelation helps us transcend this dire and precarious state. The path our minds must follow, as some ancient sages have noted, leads from the chaotic plurality surrounding us to the divine, original unity from which all creation arises. Understanding mathematics can represent an intermediate step along this path.

Before we become capable of recognizing, in the multitude of *accidental* forms around us, the *substantial* forms created by God, we must train our minds to transition from empirical observations to intellectual definitions. This process requires a noetical (from νοῦς – intellect) capacity that must be rigorously trained to distinguish what is essential from what is secondary, accidental, illusory, or insignificant. Mathematics is the best form of education for this kind of *intellectual purification*.

The art of numbers—algebra, as we call it—helps us work with groups of entities classified under the abstract concepts that numbers represent. Similarly, the art of exterior forms—geometry—helps us identify even the structures underlying the appearances of the world. Plato demonstrated in extraordinary detail how this can be achieved in his monumental dialogue *Timaeus*, describing creation through a symbiosis of extremely complex three-dimensional geometric forms.

Through such meditations, mathematics enables the disciple of philosophy to grasp the essential in the tumult of our current (fallen) knowledge, dominated by empiricism and sensory experience at the expense of intellect. Mathematical practice thus becomes an art of purifying the mind, removing everything that hinders its elevation toward the contemplation of essences.

Of course, this is not the mystical and ecstatic experience brought about by divine grace in the faithful, as seen in the passive contemplation of God’s presence. Mathematical study, as practiced by the Pythagoreans, serves as a form of *active* contemplation, where the primary role lies with the individual engaging in these “spiritual exercises.” This discipline can be seen as a precursor to dialectics (or logic), which follows once mathematics is well assimilated.

Although Pythagorean mathematics bears little resemblance to what we find in today’s textbooks, its foundation was laid by those ancient lovers of wisdom. By rediscovering its original significance, mathematics might guide our minds not toward engineering aimed at mastering nature, but toward contemplation, preparing us for deeper contact with the realm of spirit and its magnificent, immortal King—God.

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