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PYTHAGOREAN THOUGHT IN THE MODERN WORLD: EXPLORING ATANASIJEVIĆ'S PERSPECTIVE ON ITS RELEVANCE

Abstract: In her writings on ancient philosophy, Ksenija Atanasijević deals with the most important aspects of Pythagorean thought – the theory of number and harmony, the doctrine of transmigration of souls, as well as Pythagorean protofeminism. Furthermore, she proposes that Pythagorean thought is still very much relevant for the modern world, particularly contemporary science. In this chapter, we offer substantial evidence in support of her claim. The Pythagorean-Platonic thesis that the structure of the world can be explained by harmonious whole-number ratios of physical quantities is very significant, and inspired by musical analogy. Although an aesthetic approach to the study of nature appears to be mostly outdated, it is important to note that it survives in a different, modernized form within some leading scientific theories. Further, the chapter discusses the Pythagorean doctrine of “transmigration of souls.” Could Pythagorean *metempsychosis* be an early version of the thesis of the continuity of life? Finally, one of the milestones of Pythagorean practice was to provide philosophical education to gifted women. It could be said that Pythagoreans undertook the first serious steps in the direction of women’s emancipation. Atanasijević’s thesis that some of the most notable Pythagorean philosophical ideas are represented in modern world appears to be quite plausible and is clearly supported by influential scholars.

Keywords: Pythagoreanism, ancient science and modern world, metempsychosis, protofeminism.

Contemporary academia, usually guided by the maxim “publish or perish!” would not even recognize Pythagoras as a legitimate philosopher. He left no writing, he avoided public appearances and his teachings were quite esoteric, delivered to a handful of selected pupils. Yet, Pythagorean

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philosophy has exerted profound influence on Western thought. Here is a great example, then, of ideas surpassing and outliving the man. What do we know about Pythagoras? Although many details about his life are unknown, most researchers agree that he was born around 570 B.C. at the island of Samos, that he spent as many as 22 years in Egypt studying with the priests (Guthrie & Fideler, 1987), that he moved to Croton in Southern Italy around the age of 40 and founded the first Pythagorean societies. Guthrie & Fideler speculate that Pythagoras might have visited Persia as well, but they consider this doubtful. Supposedly, Pythagoras was the first to coin the terms *philosophy* and *mathematics*, and this led to the claims he founded or “invented” these disciplines. This is, of course, wrong. Pythagoras merely advanced philosophical and mathematical studies, by building upon the knowledge he acquired during his travels. In scholarly literature, we may find opposing views on the Pythagorean contribution to Western rationalism. For example, Burkert (1972) argues that early Pythagoreanism was, in fact, mystical, irrational and backwards. Yet, he admits that alongside many other scholars late Pythagoreanism, particularly in its Platonic version, paved the way for the development of the modern scientific method which usually rests upon various types of mathematical modelling.

In her writings on ancient philosophy, Atanasijević (2007) deals with the most important aspects of Pythagorean thought – the theory of number and harmony, grounded in musical analogy, the doctrine of transmigration of souls, as well as Pythagorean protofeminism. This includes three short papers “Pythagoras of Samos” (Личност Питагоре са Самоса),¹ “The Pythagorean Theano” (Питагореичарка Тхеана) and “Pythagorean Teaching on the Transmigration of Souls” (Питагорејско учење о селењу душа), and a slightly more extensive treatise entitled “The Pythagoreans” (Питагорејци), which is part of her joint considerations on Pythagorean philosophy, Epicurus and Giordano Bruno and purports to show their relevance for contemporary natural science (“Питагорејци, Епикур и Ђордано Бруно – претходници савременог атоанизма и астрономије”). Atanasijević was clearly fascinated with Pythagoras and the myths surrounding him. She explicitly compares him to Buddha (2007, p. 67), mentioning some of the most fantastic stories about him, such as that he was seen at two places at the same time, that his hip was made of gold, or that he foresaw an earthquake (p. 66). However, at the end of “Pythagoreans,” which elaborates on Pythagorean philosophy of mathematics and philosophy of nature and cosmology, she proposes that

1 Bibliographical data on Atanasijević's papers on Pythagoreanism is directly quoted from the list at the end of her collected writings on ancient philosophy (2007, pp. 559–561).

Pythagorean thought is still very much relevant for the modern world, particularly contemporary science:

Pythagoras deeply inspired Bruno with his view that numbers express the essence of things. Through Giordano Bruno's teaching on the monad, it is possible to establish the dependence on Leibnitz' monadology on Pythagorean philosophy. And through Bruno's monadology, Pythagoras influenced contemporary atomists. (Atanasijević, 2007, pp. 478–479)

One of the main goals of our paper is to explore and further develop Atanasijević's thesis that Pythagoreanism is relevant for contemporary science.

The intimate relationship between early Pythagoreanism and the Orphic religion, as well as the scarcity of written sources, led authors such as Burkert (1972, 1985), Cornford (1987) and Gregory (2021) to establish sharp boundaries between the irrationality of number mysticism and the doctrine of transmigration of the early period on the one hand, and mathematical physics, mathematical astronomy and rational psychology of the late period on the other. And although Pythagorean philosophy does contain irrational and rational elements, it is quite difficult to distinguish between them: as we shall see, clear lines cannot be drawn. Judging the rationality of a concept is rarely a straightforward process, and often requires thorough analysis of the socio-historical and linguistic context in which the given concept appears.

While the influences of Egyptian mathematics, astronomy and religion on Pythagorean philosophy are acknowledged by well-nigh every scholar, some authors also recognize the possibility that Pythagoras was influenced by eastern, particularly Indo-Persian and even Chinese philosophy (Atanasijević, 2007, Burkert, 1985, Cornford, 1987, Guthrie, 1962, Marlow, 1954). They, however, offer little or no argumentation for their claims; those given rest upon "loose" parallels between ancient Greek and Eastern philosophical systems, instead of testimonies of ancient writers. The Pythagoreans, both older and younger, conducted gradual "demystification" of the semi-rational theories on the origin of the world and man's place in it, which developed before the 6th century B.C. In general, Pythagorean philosophy can be considered a key link between older philosophical and religious systems of the Middle East, Asia Minor and possibly Persia and India, and subsequent Greek philosophy that sets the foundations for Western rationalism and empiricism. This is why we must distinguish between ancient Pythagoreanism, which encompassed Pythagorean and Neopythagorean schools of antiquity, and Pythagorean tradition in

the broader sense. Pythagorean ideas show up in modern philosophical works, such as Descartes' *Regulae* (Kandić, 2012), or Hegel's *Science of Logic* (Kandić, 2013), they find their place even in contemporary sciences and arts (Kandić, 2018). Perhaps we owe the Pythagoreans much more than we are ready to admit.

In the present chapter, we shall discuss some of the basic tenets of the Pythagorean tradition, and remind ourselves of their presence in the modern world. Most attention will be given to the Pythagorean-Platonic thesis that the structure of the world can be explained by harmonious whole-number ratios of physical quantities. This thesis is inspired by an analogy with music, and is aesthetic in character. Is, then, irrationality at the root of mathematical cosmology? Why should we regard Plato's version of musical analogy rational, and the early Pythagorean one irrational? For the *mathematikoi*, the continuous dynamics of symmetry and asymmetry constitutes a distinction between order (*kosmos*) and chaos (*haos*), a state with "no measure." Also, we will discuss the Pythagorean doctrine of metempsychosis, i.e., "transmigration of souls," adopted by Plato in several dialogues. At the first glance, the concept of metempsychosis appears to be completely irrational. However, it could be understood as an early version of the thesis of the continuity of life. Finally, one of the milestones of Pythagorean practice was to provide philosophical education to gifted women. Although ancient feminism differs in many ways from modern feminism, it can be said that Pythagoreans undertook the first serious steps in the direction of women's emancipation. Thus, we shall see that Atanasijević is right to claim that Pythagorean philosophy influenced modern natural-philosophical and social thought.

Pythagorean natural-philosophical investigations were highly motivated by the discoveries in music and acoustics. The experiments which Pythagoras and his followers conducted on monochord, a single-string instrument, showed that whole number ratios on the string, such as 1:2, 2:3, 3:4 and so on, produced beautiful, harmonious musical tones. Inspired by the musical analogy, the Pythagoreans, as well as other Greek philosophers – particularly Plato – postulated that *sensory qualities correspond to quantitative relationships between physical magnitudes*. Today, this idea is widespread and common in natural sciences. In fact, it is almost impossible to practice physical science without studying numerous quantitative relationships between the elements of complex, dynamic structures. Measurement has become one of the cornerstones of natural science. However, from the standpoint of history and philosophy of science, it is important to note that the very first steps that led to the development of mathematical physics and mathematical modelling in general, were inspired by *aesthetic*,

emotional experiences. If the Pythagoreans had not been emotionally struck by the harmonious tones the monochord produced under particular circumstances, would they have conceived of mathematical cosmology at all? Is, then, Western scientific rationalism paradoxically based on the irrationality of the musical, aesthetic experience, which is itself subjective in character? Surely, there are multiple ways to discover that some sensory qualities can be explained by quantitative ratios. Experiments in chemistry, for example, might easily guide us to this conclusion. Contemporary natural sciences rarely employ musical analogies, as they do not rely on aesthetic criteria. On the other hand, it is evident that the Pythagorean-Platonic notions of symmetry, harmony and proportion, appear not only in the works of influential modern philosophers, such as Descartes, Kant, Hegel, or Schelling, but also within some of the leading contemporary cosmological theories, such as the Big Bang (Brisson & Meyerstein, 1995), or string theory (Pešić & Volmar, 2023). Various conceptions of symmetry, more or less similar to the ancient Greek one, still play a key role in theories of the origin of the world, structure of matter and origin of life.

In the first part of her paper “Pythagoreans, Epicurus and Giordano Bruno – The Predecessors of Contemporary Atomism and Astronomy,” Atanasijević recognizes that the Pythagorean system of harmony, theory of number and musical analogy are intimately connected (pp. 472–476). She quotes the famous passage on the Pythagorean teachings from Aristotle’s *Metaphysics*:

Since of these principles numbers are by nature the first, and in numbers they seemed to see many resemblances to the things that exist and come into being – more than in fire and earth and water (such and such a modification of numbers being justice, another being soul and reason, another being opportunity – and similarly almost all other things being numerically expressible); since, again, they saw that the attributes and the ratios of the musical scales were expressible in numbers; since, then, all other things seemed in their whole nature to be modelled after numbers, and numbers seemed to be the first things in the whole of nature, they supposed the elements of numbers to be the elements of all things, and the whole heaven to be a musical scale and a number. (Atanasijević, 2007, p. 473, *Met.* 985b-6a)

Atanasijević elaborates the most important aspects of the Pythagorean conception of number, and credits Philolaus with making Pythagorean esoteric teachings widely available. Things “imitate” numbers and participate in numbers – if there were no numbers, things would be limitless

and unknowable (p. 473). Philolaus considered numbers the essence of eternal being.² Unlike material things, numbers are eternal, unchangeable and immovable (p. 473). According to Atanasijević, the Pythagorean claim that numbers are the principle of all things had two main interpretations: numbers are either substance, of which things are made, or model, according to which things are made (p. 474). The key contribution of Pythagorean philosophy is, therefore, the concept of *universal mathematics* (p. 474). Atanasijević also points out that ethical concepts were given mathematical interpretations by the Pythagoreans, and that the first ten numbers were personified (p. 475): Philolaus, for example, associated ancient Greek gods with numbers and geometrical figures.

However, the Pythagorean project of natural philosophy based on the beauty and simplicity of ideal symmetrical ratios, ran into huge obstacles from the beginning. The discovery of irrational numbers, i.e., *asymmetry* (incommensurability), endangered the idea that the world's structure may be explained by the harmonious whole number ratios. It is unclear when this other significant discovery happened. While the earliest ancient Greek proofs of irrationality of diagonal of a square originate in 5th century B.C. (Popper, 2002), it is still possible to speculate that some of the early Pythagoreans, and maybe even Pythagoras himself, knew about mathematical irrationality (which is distinct from psychological irrationality).³ Esoteric Pythagorean schools, in which the so-called *mathematikoi* held the upper hand, usually operated in secrecy. According to some sources, *mathematikoi* wanted to keep the discovery of asymmetrical ratios away from the public as long as possible. Iamblichus, for example, tells us inconsistent stories about Pythagorean Hippasus, in which he suggests that Hippasus was drowned at the sea because he publicly revealed the existence of asymmetry, along with the construction of a dodecahedron in a sphere (Guthrie & Fidler). However, late Pythagoreans, such as Philolaus, whose cosmological theory was one of the main sources for Plato's *Timaeus*, openly spoke about asymmetry and considered it a necessary and unavoidable aspect of the world's harmonious, geometrical structure; by Plato's time, asymmetry was common mathematical knowledge.

Interestingly, ancient philosophy scholars rarely dwell on this topic, and its relevance for the history of science. On the other hand, Popper (2002),

2 For a discussion of the role of decade in Philolaus' system, see Deretić, Knežević (2020).

3 In his *Timaeus*, Plato attempted to reduce psychological irrationality to the mathematically irrational aspects of the circles of the World soul (the circles of Different), as well as the so-called elementary triangles. Strange as it is, this was one of the first psychophysical theories that employed mathematical modelling.

a renowned historian and philosopher of science, as well as Milanković (1947), the famous Serbian scientist, argue that the discovery of irrationality was of tremendous importance for the development of the natural sciences. Atanasijević notes this as well (2007, p. 472, 475). The apparent “contradiction” between symmetrical and asymmetrical ratios was resolved through *geometrical representation*. The geometry of the sphere, as well as regular polyhedrons, was used by Pythagoreans to portray the supposed relationship between numbers and the cosmos, between the beauty of ideal harmonious ratios and the instability and changeability of the physical world. The significant distinction between order (*kosmos*) and chaos (*haos*), the state with “no measure” (*alogos*), was explained by the continuous dynamics of symmetry and asymmetry. For the learned Pythagoreans (*mathematikoi*), the physical world did not comprise symmetry only, but consisted of the continuous “cooperation” between symmetrical and asymmetrical ratios. This view was adopted and further developed by Plato. In fact, Popper praises Plato highly for the *geometrization of arithmetic* (although this idea was genuinely Pythagorean). According to Popper, Plato’s “geometrical atomism,” which was mostly based on the geometry of the so-called elementary triangles, saved the Greek cosmology from the pitfalls of irrationality, and even represented an advancement over Democritus’ atomistic theory. Through Plato, some of the most important aspects of Pythagorean cosmology were refined and transmitted to the wider public, influencing myriad thinkers from antiquity to the present.

If we switch from the ancient Greek world to ours, what do we see? Although from the point of view of contemporary natural sciences, the original Pythagorean aesthetic approach to the study of nature appears to be mostly outdated, we can clearly see that it survives in a different, modernized form within some of the leading scientific theories. For example, Brisson & Meyerstein (1995), in the book entitled *Inventing the Universe*, argue that the Pythagorean-Platonic notion of spherical symmetry stands at the heart of the contemporary Big Bang model. Similarly to Plato and the Pythagoreans, Big Bang theorists postulate that the structure of the visible, changeable physical world can be explained by combinations of simple, unchangeable mathematical entities that go on to constitute the world’s complex, dynamic structure. The notion of beauty is still relevant for contemporary physicists! Late in life, Heisenberg writes

That these interrelations display, in all their mathematical abstraction, an incredible degree of simplicity, is a gift we can only accept humbly. Not even Plato could have believed them to be so beautiful. For these interrelationships cannot be invented; they

have been there since the creation of the world. (Hossenfelder, 2018, p. 37)

Another great physicist, Paul Dirac, claimed that the laws of physics must be “mathematically beautiful” (Hossenfelder, 2018, p. 30–31). Furthermore, both Heisenberg and Dirac conceived their successful theoretical models *before* they turned to the Pythagorean-Platonic aesthetic paradigm. These successful models are certainly not “beautiful,” in fact, some of their aspects are quite “ugly” and cumbersome. In her book *Lost in Math: How Beauty Leads Physics Astray*, Sabine Hossenfelder argues that the concept of beauty, which is usually associated with the principle of symmetry, obstructs the development of physics and natural science. Similarly to Pythagoreans, contemporary physicists realized that the principle of symmetry has to be complemented with the principle of *spontaneous symmetry breaking*. Perhaps paradoxically, even the theory of supersymmetry (SUSY) has to incorporate asymmetry – otherwise, the mathematical model loses its connection to observable, physical reality. How is it possible that some of the most influential contemporary physical theories are overwhelmed with the “opposition” of symmetry and asymmetry – the very same issue that troubled the Pythagoreans a long time ago? Does this mean that symmetry and asymmetry are fundamental characteristics of our world, or that these notions are somehow fundamental to the human psyche and are thus imposed in our theoretical models?⁴

In the contemporary world, some of the most striking examples of the Pythagorean-Platonic musical analogy can be found in string theory (Pešić & Volmar, 2023), whose theorists occasionally employ musical metaphors. In his popular book *The Elegant Universe: Superstrings, Hidden Dimensions, and the Quest for the Ultimate Theory*, physicist Brian Green explicitly mentions Pythagorean “music of the spheres” (1999, p. 135); Barry Parker compares the vibrations of one-dimensional strings to the vibrations of real violin strings (1987, p. 249); while Kaku & Thompson provide the following explanation of superstring theory:

The superstring theory can produce a coherent and all-inclusive picture of nature similar to the way a violin string can be used to unite all the musical tones and rules of harmony. ... Knowing the physics of a violin string, therefore, gives us a comprehensive theory of musical tones and allows us to predict new harmonies

4 The psychoanalyst Ignacio M. Blanco established that the functioning of the human psyche mainly depends on the experience of the Same, which corresponds to symmetry, and the experience of the Different, which corresponds to asymmetry. He was influenced by contemporary physics, as well as Plato’s philosophy (Blanco, 1975).

and chords. Similarly, in the superstring theory, the fundamental forces and various particles found in nature are nothing more than different modes of vibrating strings. (1987, p. 5)

Although these metaphors are primarily used to make string theory more accessible to the wider audience, they clearly show that Pythagorean-Platonic cosmological paradigm has its place in contemporary natural science, just as Atanasijević claimed.

In a nutshell, the Pythagoreans, as well as the majority of Greek thinkers, did not differentiate between psychological and natural philosophical concepts very well, the aesthetic and the real were often confused, and thus the beauty of mathematical ideal became the basis of their natural science. Such issues persist even in our times, though to a lesser extent.

Next, we will consider the doctrine of metempsychosis or the transmigration of souls – one of the key concepts of Pythagorean psychology. Since Pythagoreans believed that the principles of mathematics were the principles of all things (Aristotle, *Metaphysics*, 995a), the soul, or *psyche*, also shared an intimate relationship with numbers, symmetry and harmony (Luchte, 2009). And since mathematical entities were considered by Pythagoreans divine and eternal, the soul was, consequentially, immortal and distinct from the mortal body. Of course, if they believed that things *are* numbers and that numbers are eternal, one can only wonder why Pythagoreans subscribed to a dualist worldview. For Plato, mathematical entities were transcendent archetypes, but for the early Pythagoreans, they were equal to physical objects. Yet, in their opinion, only the soul possessed immortality, while the physical body was called “the tomb of the soul” from which we must free ourselves (Plato, *Phaedo*, 81c-d). From a contemporary point of view, this Pythagorean-Platonic conception of mathematical cosmology often ‘feels’ rational and pragmatic, even though it is based on the irrationality of the aesthetic experience. On the other hand, the doctrine of metempsychosis appears to be completely irrational, and plagued with unresolvable inconsistencies. What can we make of it?

First of all, the concept of metempsychosis is not originally Pythagorean. It was adopted from earlier religious systems. Herodotus claimed that Pythagoras learned about metempsychosis from Egyptian mythology, but scholars such as Guthrie, Burkert, Marlow and Luchte, disagree with this, since the Egyptian religion did not include beliefs in reincarnation. Atanasijević (2007, p. 72–73) suggests that Pythagorean metempsychosis originates in Hinduist religions. Burkert, Cornford and Marlow also suggest that religious and philosophical systems which developed on Indian subcontinent, such as Hinduism or Buddhism, may be the true source of Pythagorean conception of metempsychosis. This is, of course, diffi-

cult to prove. Ancient writers do not mention that Pythagoras traveled to India and Persia, nor that he studied Hinduist or Buddhist religious texts anytime during his life. But metempsychosis *does* share numerous similarities with reincarnation. In his paper “Hinduism and Buddhism in Greek Philosophy,” Marlow (1954) draws parallels between Greek and Indian literature, mythology and philosophy. Not only Pythagoreanism, but also the philosophical systems of Anaximander, Heraclitus, Empedocles – and most importantly – Plato, share numerous similarities with Indian thought. According to Marlow, some of the most famous passages in Plato, usually considered Pythagorean in origin, possess adequate correlates in older, Indian thought: the aforementioned idea that the body is the tomb of the soul can be found in *Phaedo*, the idea of rebirth in *Phaedrus*, *Phaedo* and the *Republic*, including the famous allegory of the cave which suggests that true reality exists behind appearances. Thus, the hypothesis that Pythagorean concept of metempsychosis comes from India, though difficult to prove, seems plausible. Through the oral tradition, which was transmitted by *akousmatikoi*, the doctrine of transmigration spread across the Greek world, and was even incorporated into Plato’s ethical and psychological theories.

Atanasijević argues that although the possibility that Pythagoras learned about metempsychosis from Indian religion, which might have spread through Persian conquests of Asia Minor, cannot be excluded, it is more likely that this concept originated in Orphic teachings. In support of this thesis, she enumerates four similarities between Pythagoreanism and the Orphic religion: the belief that the soul is of divine nature and that it outlives the body; awareness of pain as one of the key aspects of existence; belief that divinity is just and good, and acts with intention to help people; and finally, belief in salvation through the union of human and divine (2007, p. 73). She mentions fantastic stories about Pythagoras remembering his previous lives. Also, she notes that Plato’s eschatological myths are influenced by Pythagoreanism to a great extent, providing the example of *Gorgias*, in which Socrates reveals to Calicles that “we are now dead, and the body is our tomb” (493a). Due to the oddness of the concept, some ancient writers ridiculed Pythagorean metempsychosis. However, the most interesting aspect of Atanasijević’s interpretation of metempsychosis, or *palingenesis*, is, perhaps, the comparison with Nietzsche’s famous theory of eternal recurrence. Atanasijević even quotes the most relevant passages from *Also Sprach Zarathustra*, and compares them to the words of the late Pythagorean Eudemus (2007, p. 75).

According to Burkert “the doctrine of transmigration presupposes that in the living being, man as animal, there is an individual, constant

something, an ego that preserves its identity by force of its own essence, independent of the body which passes away” (1985, p. 300). It appears that Pythagoreans were concerned with the same, or very similar issues as modern philosophers, psychologists and biologists. These are the issues of personal identity, selfhood, mind-body relationship, as well as generation of living things from non-living matter. However, the scientific and philosophical vocabulary the Pythagoreans and other ancient Greek thinkers had at their disposal was quite different from ours, and also quite limited in scope. Many physical and biological phenomena were poorly understood or undiscovered. Today, mostly due to the specialization of scientific disciplines, the psychological notion of mind and the biological notion of life have almost nothing in common. Mental processes, particularly thoughts and emotions, are usually studied independently from biological processes.⁵ For the Greeks, however, the terms *psyche* and *bios* were quite interconnected. *Psyche* did not denote only mental processes, the inner life of a person, but also life force in general, the animating principle of life, and sometimes even ‘breath’. Etymologically, *psyche* is derived from *psukho*, which literally means ‘I blow’. As we have pointed out, the ancient Greeks did not differentiate between psychological and physical concepts clearly, they often believed that the psychological principles were the principles of the natural, physical world. Could the doctrine of transmigration be understood as one of the early, “rough” formulations of the thesis of *the continuity of life*, prominent in modern biology? If that is the case, then the notion of metempsychosis is not irrational, since it is based on correct observation that *something persists in the transformations of biological organisms*. It is the Pythagorean *explanation* of metempsychosis that is indeed irrational, given that it thrives on various abstract, mythical and religious concepts.

In a debate on the nature of the self, the biologist Jean-Pierre Jacquot talks about the provocative relationship between the ancient belief in metempsychosis and contemporary biology:

Metempsychosis is a belief that a soul can exchange bodies, that after death you can retransform yourself into a completely different human being, animal or even plant. I do not know if souls exist but biology tells me that indeed we transform ourselves constantly into plants and micro-organisms in ways that are similar to metempsychosis. Apparently in eastern beliefs metempsychosis does not necessarily require the notion of a soul, but we could possibly transform the word *metempsychosis* into *metemsomasis*, the soma

5 The emerging, interdisciplinary fields of research such as psychophysics, neuropsychology, or biopsychology, aim to bridge the apparent gap between mind and body.

being more or less the bodily part of a human being. In this sense, yes, I believe in metempsychosis. (Jacquot & Pouivet, 2023)

The cyclical, repetitive nature of living processes is explanatory cornerstones in biology. The cycles of water, carbon or nitrogen ensure the continuity of life on our planet. When a biological organism dies, it decomposes into smaller parts, and these parts may be incorporated into other organisms through nutrition. And if some of these parts contain critical biological information, such as DNA molecules, then yes, certain aspects of our personal identities ‘survive’ death and become parts of other living beings. Unlike the irrational Pythagorean explanations that employ unverifiable or, as Popper would say, unfalsifiable concepts, the materialistic explanations of modern biology could be tested in laboratory experiments. That is the key difference. Still, the Pythagorean belief in metempsychosis is not *entirely* irrational. Jacquot’s suggestion that today, instead of “metempsychosis,” we rationally believe in “metemsomasis,” seems quite reasonable.

Finally, we will address Pythagorean “feminist,” or protofeminist ideas. This is the least explored aspect of Pythagorean philosophy. In Pythagoreanism, even gender differences were explained by mathematical principles – in the Pythagorean table of opposites, the male was associated with odd numbers, the female with even (Aristotle, *Metaphysics*, 986a). Since the very same table associated female with “evil” and “darkness,” some scholars labeled Pythagoras a male chauvinist. However, in her book *Pythagorean Women*, Pomeroy (2013) dismisses Aristotle’s account on the table of opposites, arguing that Pythagoras and Pythagorean societies were the first in the Greek world to include women among their disciples. Their number was small. For example, Iamblichus lists 235 Pythagoreans, of which only 17 women. Although much of the history of early Pythagoreanism is controversial, Pomeroy manages to find numerous reliable sources which confirm that women in Pythagoreanism played an active role. They were not only disciples, but also teachers and philosophers. Pomeroy lists Theano, Cheilonis, Tyrsenis, Myia, Damo and Aspasia among the most influential Pythagorean women who possessed philosophical education. Theano was, supposedly, Pythagoras’ wife, and Myia their daughter. It is interesting that many of the Pythagorean women were from Sparta. Sparta was one of the rare Greek states in which women had the right to participate in social and political activities. Yet, their education was quite limited in scope, and mostly concerned the duties and responsibilities of looking after the home. For Spartan and other Greek women, joining Pythagorean societies presented a rare opportunity to engage in philosophical studies, on an equal footing with men. While Pythagoreans did not

allow women into governing positions, they allowed them to acquire the knowledge of the *mathematikoi*.

Atanasijević appears to be fascinated with Theano – perhaps to the same extent as with Pythagoras. In her brief paper on Theano, she considers the three letters, supposedly, preserved by ancient biographers. However, Atanasijević was aware that the sources on Pythagorean women were problematic (2007, p. 69): some authors ascribe the letters to Theano from the 6th century B.C., some to Theano II – as Pomeroy calls her – who most probably lived between 4th and 3rd centuries B.C. Nevertheless, it is important to see how Atanasijević imagines Theano on the basis of the content of these letters, which mostly concern various ethical and social issues, such as education of children, marriage, adultery and the treatment of female slaves (pp. 69–71). The first letter puts forward several ideas about the education of children: mothers, who should develop temperance in their children, should also be able to do hard work, as well as bear hunger and thirst. Herein, Atanasijević recognizes Spartan influences. The second letter is a consolation for a jealous woman. She is desperate because her husband supports another woman. Theano suggests that the virtue of the wife is to bear and tolerate the husband's vices, and that the husband will come back after he grows bored of his lover; only passion connects them, and passion is short-lived. The third letter is, possibly, most important for the history of feminism. Atanasijević points out that Theano clearly argues that female slaves, or servants, possess human nature, and thus should be treated in a good manner. They should not be severely punished, because this may corrupt their nature. According to Atanasijević, apart from her stance on the role of women in marriage, Theano's views represent an advancement over traditional ancient Greek beliefs (p. 71).

Unlike Athens, Sparta and Pythagorean societies provided at least some rights to women, and thus possibly influenced Plato who put forward his famous argument in favor of gender equality in the fifth book of the *Republic* (Kandić, 2021). In Plato, Pythagorean protofeminism is elevated to much higher levels. Plato's ideal state is supposed to provide the best philosophical education to gifted women from the guardian class, and then, if they are up to the task, place them into governing, ruling positions – something even the Pythagoreans did not dare to do. In my discussion on Plato's protofeminist ideas, I point out the key differences between the Pythagorean and Platonic conceptions of women's role in society:

First, in Plato's ideal city, the educational practices mostly apply to the guardian women, while in Pythagorean societies they encompass the entire female population. Second, in Kallipolis,

female rulers, or philosopher-queens are made possible, but in early Pythagoreanism there is no evidence that women were assigned ruling tasks. Third, the communism of property, which was present in early Pythagorean societies, is extrapolated to the communism of wives and children in the *Republic*. Even though the Pythagoreans called for philosophical education of women, they retained their traditional roles of wives and mothers, and unlike Plato, highly praised the traditional concept of “nuclear” family by making it fundamental to the unity of their classless society. (Kandić, 2021, p. 12)

Though they have rights and are treated equally as men, women in Plato’s society are nothing but the tools of the state, used to achieve various political, economic and military goals.

While Atanasijević published a paper on the social role of women in Plato’s *Republic*, she did not explore its relationship to Pythagoreanism (“On the Emancipation of Women in Plato,” О еманципацији жена код Платона). Atanasijević considers Plato’s social theory a milestone in the development of women’s rights, as it clearly goes against traditional beliefs and practices held by historical Athens. She proposes that Spartan views on women were the model for Plato (2007 p. 275). In her paper, she points out all of the most important aspects of Plato’s protofeminism: his famous argument that female nature is not different to the male, that women should perform all tasks as men even though they’re physically weaker, that talented women should receive the highest possible education and take governing positions in the state. Atanasijević concludes that Plato was the first thinker who systematically proved that the difference between men and women is “only quantitative and not qualitative” (2007 p. 278).

However, all versions of ancient (proto)feminism are *instrumental* in character. The reasons for inclusion of women were neither emancipatory nor liberal in the modern senses of the word. The period between 6th and 4th century B.C., during which Pythagoreanism developed, was incredibly dynamic not only in ancient Greece, but also in other parts of the world, such as India, Persia, and China. It was a time of massive intellectual, economic, and military development which necessitated expansion of work force. Each member of society became valuable resource, including women. For the Ancients, in the case of gifted women, the primary biological function to bear offspring became less relevant than before. According to Pomeroy and Atanasijević, Pythagoreans were among the first in the Greek world to recognize the importance of

engaging women in social activities, providing them with philosophical education. Still, it is important to point out that ancient societies did not view women as an oppressed minority whose social position had to be improved as a matter of justice. While contemporary feminism is closely related to libertarian philosophy, this was not the case with ancient feminism. Pythagoreans and Plato did undertake important, first steps towards female emancipation, but their motives were quite different from those of modern social architects. There are, of course, many examples of the instrumentalization of women in modern times as well. We must not forget that the inclusion of women in the military is not always libertarian in character, rather a consequence of difficult security contexts some modern states face.

Pythagorean philosophy appears to remain relevant even in our times. It is impossible to disagree with Atanasijević on this. The Pythagorean tradition comprises much more than the Pythagorean and Neopythagorean schools of antiquity, including numerous authors and thinkers who share some Pythagorean ideas – even if they were not acquainted with genuine ancient Pythagoreanism. Pythagoras and his followers adopted mathematical, philosophical and religious teachings of older Middle Eastern, and possibly Eastern civilizations. They managed to express them in Greek, and make them familiar to the Greek world, which would go on to influence Western civilization. Thus, by transforming the irrational and semi-rational theories of antiquity into the theoretical basis of Western scientific rationalism, the Pythagoreans played a significant role in the development of modern philosophical and scientific thought. Still, it is considerably more difficult to distinguish between rational and irrational elements in Pythagorean philosophy than at the first glance. Furthermore, some of the issues that plagued Pythagorean and ancient Greek thought, persist even in contemporary sciences. The demystification of early Pythagorean teachings on the nature of man and the cosmos is a gradual process which is, perhaps, still taking place. Although at first glance contemporary science appears to have very little in common with Pythagorean philosophy, we may suddenly realize that some of the most important theoretical concepts in physics, biology and psychology, and even ethics, represent new, heavily modernized versions of the old Pythagorean-Platonic philosophical paradigms. Regardless of whether we consider Pythagorean thought rational or irrational, Atanasijević's thesis that some of the most notable Pythagorean philosophical ideas are represented in the modern world, particularly in contemporary science, appears to be very plausible and is clearly supported by influential scholars.

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