

Chapter 2

The Philosophical Myth of Creation—The Platonic Philosophy of Nature

1 Ideas and Their Shadows

The next important developmental step in the philosophy of nature was the result of Socrates' interest in virtue! The modern concept of virtue as moral correctness originates with Socrates. In order to formulate that concept, it was necessary to rise to a high level of abstraction. It is very characteristic that European philosophy began to sharpen its theoretical tools on problems connected with ethics. It was precisely on the terrain of ethics that the concept of *essence* first appeared. Socrates asked, for example: What is justice? Wanting to distinguish justice from related virtues, he sought those traits which were their essence and not just those which happen to be associated with justice. An awareness of the difference between the *constitutive traits*, which were its essence, and the *accidental traits*, which only happened to be associated with the given concept, was a major achievement of Greek philosophy. It produced Plato and has had an impact on all of European thought.

Plato, who was a disciple of Socrates, extended the concept of essences from the sphere of morality to all spheres of thought.¹ The genius of Plato told him to seek understanding of essences in the simplest cases. It is not surprising that it directed him to geometry (not without the influence of Pythagorean philosophy). Where, for example, should one search for the essence of a sphere? Not among material things, because in the material realm one can find only “simulacra of spheres,” but not the “ideal spheres” about which geometry tells us. Despite that, the ideal spheres of geometry exist, for geometry shows us the laws of their existence. Here is the source of the *Platonic doctrine of a world of ideas (or forms)*. Things that are accessible to the senses are only the shadows of their ideas. The ideas exist really; the existence of things accessible to the senses are derivative in relation to the existence of ideas.

¹This chapter is, in significant part, based on my article “*Timajos*—filozoficzny mit o pochodzeniu i naturze świata” *Analecta Cracoviensia* 17 (1985): 111–123.

In the *Timaeus*, Plato put the question:

Do all those things which we call self-existent exist? Or are only those things which we see, or in some way perceive through the bodily organs, truly existent, and nothing whatever besides them? And is all that which we call an intelligible essence nothing at all, and only a name?²

For Plato explicitly formulated one of the most important dilemmas of philosophy: *essentialism*—essences exist and knowledge of them is possible, vs. *nominalism*—any kind of general knowledge, distinct from that which is perceived by the senses, is nothing more than words (names). The debate between those two views—in various forms—appears on nearly every page of the history of philosophy. In the Middle Ages, it took the form of the famous *debate about universals* (whether there exists something which corresponds to general concepts); in our times it has made itself known in the radical statements of the neo-positivists (nominalism) and the later reaction to them (not necessarily in the form of essentialism). Essentialism usually opens the road to metaphysics, nominalism is very often associated with extreme empiricism.

Platonic essentialism has two aspects:

1. *The Metaphysical Aspect*: the world of ideas exists (is), but it never becomes, while the world accessible to the senses becomes, but never is.³ The following text from the *Timaeus* provides a commentary on that formulation:

Wherefore also we must acknowledge that there is one kind of being which is always the same, uncreated and indestructible, never receiving anything into itself from without, nor itself going out to any other, but invisible and imperceptible by any sense, and of which the contemplation is granted to intelligence only. And there is another nature of the same name with it,⁴ and like to it, perceived by sense, created, always in motion, becoming in place and again vanishing out of place, which is apprehended by opinion and sense.⁵

2. *The Epistemological Aspect*, which was already hinted at in the quotations above—knowledge about ideas is certain, knowledge about things accessible to the senses—only probable.

The one is always accompanied by true reason, the other is without reason; the one cannot be overcome by persuasion, but the other can: and lastly, every man may be said to share in true opinion, but mind is the attribute of the gods and of very few men.⁶

The necessity of existence and the certainty of knowledge—these are the attributes of the world of ideas; contingency and probability—these are the traits

²Plato, *Timaeus* 51c, trans. Benjamin Jowett, in Edith Hamilton and Huntington Cairns, eds. *The Collected Dialogues of Plato* (Princeton: Princeton University Press, 1961).

³See *ibid.*, 28a.

⁴This is about things which have the names of their ideas.

⁵*Ibid.*, 51e–52a.

⁶*Ibid.*, 51e.

of the world knowable to the senses. If geometry served Plato as a prototype for the doctrine of ideas, then we encounter there for the first time the philosophy of mathematics. Mathematics derives its certainty from the necessity of the world of ideas; it is divine knowledge because it gives a full knowledge of things which are not subject to change.

If things subject to sense perception are—as Plato asserted—the shadows of ideas, then it is clear why they can so effectively be described with the help of mathematics: they bear on themselves the mark of their origin. But that is a problem which can be found only embryonically in the thought of Plato. Only the rise and development of the empirical sciences will show this problem in its full sharpness. Many thinkers—consciously or not—will seek in Plato inspiration in dealing with this problem.

2 Becoming and Being

The claim that a world accessible to the senses “becomes but is not” raises the question: Why does the world become? The world requires that one provide a foundation or a reason for its becoming. The foundation of the world—according to Plato—is its creation. “What is it,” Plato asks, “which always is and never becomes; and what is that which is always becoming and never is?”⁷ The world of Ideas never becomes, but simply is, it is its own foundation. However, the becoming of a world cognizable by the senses is almost a synonym of being created. The world cannot become without a cause, and as soon as we begin to think in categories of “a cause leading to becoming” we approach a doctrine of the creation of the world. Plato emphasizes:

Everything that becomes or is created must of necessity be created by some cause, for without a cause nothing can be created.⁸

In that way, one of the most important distinctions of the European philosophical tradition was born, namely the distinction between *necessary being* and *contingent being* (the terms themselves, of course, come from a later period); the first was identified with the Absolute or with God, the second—with everything which exists outside of Him.

Therefore it is no accident that the Platonic philosophy of nature was put in terms of a myth of the creation of the world. The fundamental philosophical truth about nature is its lack of necessity and its derivativeness in relation to the world of Ideas, in other words, that it is created. The *Timaeus*—Plato’s myth about the creation of the world—was written near the end of the author’s life. As one reads through the dialog, one sees how its style breaks down and the composition gets entangled in details. But Plato did not lose the subtlety of philosophical coherence. Through the mythic form of its narration, one can clearly see a powerful

⁷See *ibid.*, 28a.

⁸*Ibid.*

philosophical construction and it is perhaps the soundness of its philosophy which underlies the fact that so many of its mythological details, after twenty-some centuries, reveal a surprising similarity to certain discoveries of modern physics. But Plato is too experienced a thinker to attach importance to overly detailed inquiries. Certain knowledge is possible only with respect to ideas, although in investigating a world of becoming “we ought to accept the tale which is probable and enquire no further.”⁹

In the Platonic myth, the creator of the world is the Demiurge, or (translating the Greek) the Artisan. But it is necessary to remember, that in ancient Greece an artisan was considered to be an artist. The world is a work of art of the Demiurge. The Demiurge fixes his eyes on the Ideas as models and shapes the world from an eternally existing material. The material existed until then “without reason and measure” only the Demiurge shaped it according to “form and number.”¹⁰

3 The Prototype of the Concept of Space

The doctrine of the Ionian philosophers of nature concerning the *arche* of the world made a strong impression on the next generations of thinkers. For many, it became an unavoidable point of departure for their own inquiries, even if in the end they had to adopt principles that were contrary to or an improvement on those of the physiologists. In the *Timaeus* we read:

Wherefore, the mother and receptacle of all created and visible and in any way sensible things, is not to be termed earth, or air, or fire, or water, or any of their compounds or any of the elements from which these are derived, but is an invisible and formless being which receives all things and in some mysterious way partakes of the intelligible.¹¹

That Platonic “receptacle of all” calls to mind Anaximander’s *apeiron* but contains aspects of Aristotelian pure passivity (prime matter), “which receives all things,” or even of substance as the subject of various properties (accidents). Nevertheless, the term *chora*, for that is the term which the author of the *Timaeus* uses to designate that receptacle, he understands very idiosyncratically. The *chora* is a kind of medium between the sense world and the world of Ideas. Because things are extended in space, they exist in the *chora*, and that in turn is a condition for their cognizability. It is not surprising that some translators translate *chora* as “space.” But it is not yet the later concept of space, understood as a completely passive container for bodies. *Chora* fulfills the function of a necessary condition both of becoming and of cognizability by the senses. E. T. Whittaker aptly wrote:

Recalling that the Ideas are incorporeal, he argues that the earthly copy of an Idea cannot be able to arouse perceptions and thus qualify as a thing of sense, unless it is equipped, so to speak, with a location; this is a necessary condition if it is to be perceived at all. It is here

⁹Ibid., 29d.

¹⁰Ibid., 53b.

¹¹Ibid., 51a.

that *chōra* comes in, as a mediating agency between the two worlds, that of appearance and that of reality: it may be thought of as a substratum which remains when all the attributes of material bodies—weight, color, etc.—are abstracted from them. Moreover, the sensuous objects may be regarded as being actually constituted of *chōra*.¹²

Various meanings of the term <i>Chōra</i>			
<i>Chōra</i> as	<i>Chōra</i> as	<i>Chōra</i> as	<i>Chōra</i> as
Subject	Medium between the world of senses and the world of ideas	Space	The condition of becoming and of the cognizability of the world

4 Time: The Moving Image of Eternity

In his analyses of time, Plato rose to the heights of abstraction. We must credit him with the discovery of *the existence of the atemporal*. The experience of transitoriness is one of the most fundamental experiences of man. In prephilosophical thought, non-temporal existence seems to be unthinkable. Plato noticed how wrong we are when we apply that kind of intuition to the world of Ideas. Although we say of an Idea that “it was, is, and will be,” in fact “‘is’ alone is properly attributed to [it].” And here appears a fundamental distinction:

“Was” and “will be” are only to be spoken of becoming in time ... but that which is immovably the same cannot become older or younger.¹³

The Ideas are always the same, one cannot ascribe to them the concept of time and change. That atemporal kind of duration Plato calls *eternity*. Only a world subject to change becomes in time. In order to explain the nature of time, Plato resorted to the following allegory:

The Demiurge, in creating the world, wanted to make it similar to the model which he was copying, that is to some Idea. The Ideas exist in eternity, but the natures of eternity and of becoming are mutually exclusive. So it was necessary to make some compromise. Here is the dilemma and its solution:

as this [first creature] was eternal, he sought to make the universe eternal, so far as might be. Now the nature of the ideal being was everlasting, but to bestow this attribute in its fullness upon a creature was impossible. Wherefore he resolved to have a moving image of eternity, and when he set in order the heaven, he made this image eternal but moving according to number, while eternity itself rests in unity; and this image we call time.¹⁴

So, according to Plato, *time is the moving image of eternity, lasting in unity, but moving according to number*. Time “moves according to number,” but is designated according to a certain unity. How is that to be understood? Plato calls to mind

¹²E. T. Whittaker, *From Euclid to Eddington* (Cambridge: Cambridge University Press, 1949), 6.

¹³Plato, *Timaeus* 38a.

¹⁴*Ibid.*, 37d.

Eastern images according to which time has the structure of a circle—the history of the world is a history of eternal returns. The author of the *Timaeus* advanced the conjecture that the heavenly bodies will someday once again have the very configuration which they had at some time in the past, the cycle of the universe will close, and everything will begin to occur again. The never-ending repetition of events is as close to eternity as the world can get.

The central problem of Platonic philosophy is the mutual relation between two worlds: the world of becoming, cognizable by the senses, and the world of existence and of Ideas (or, as we would say today, of physics and of mathematics); the problem of time is entangled in the very foundations of that relation.

5 Symmetries

The harmony and the beauty of the world are, for Plato, the harmony and the beauty of a living organism. In this respect, the author of the *Timaeus* was under the influence of the earlier Greek tradition, for which the world was rather an organism—and sometimes even a rational being—than a mechanical construction. The analogy between the universe and man (including in this analogy the human duality of soul and body) in the Platonic myth of creation has a significance that is not only a matter of juxtaposition.

In his description of “the body of the universe,” one can see certain mechanistic features (for example, that body—according to Plato—is still composed of the four Greek elements: earth, air, fire, and water), but that mechanistic view is considerably softened by Plato’s rationalism. The four elements cannot just be mixed with one another:

there must be some bond of union between them. And the fairest bond is that which makes the most complete fusion of itself and the things which it combines; and proportion is best adapted to effect such a union.¹⁵

So, the Platonic world is a mathematical world. Theaetetus, a disciple of Plato, proved that there are exactly five regular polyhedra, that is, geometrical solids, of which all the vertices, edges, and faces are equal and of which the faces themselves are regular polygons; they are: the tetrahedron, hexahedron, octahedron, dodecahedron, and icosahedron.¹⁶ The discovery of Theaetetus made a great impression on Plato. The most perfect (the most symmetrical) geometrical solid is the sphere, but second place, with respect to perfection, is taken by the regular polyhedra, later called *Platonic solids*. Because those solids are so perfect, it is necessary that they be used in the construction of the world. In Plato’s opinion, the elements have a geometrical structure and their essential features can be reduced to the attributes of symmetry. And thus, for example, the element earth consists of small hexahedra,

¹⁵Ibid., 31c.

¹⁶See, e.g., David Hilbert and Stephen Cohn-Vossen, *Geometry and the Imagination*, trans. P. Nemenyi (New York: Chelsea, 1952), 89–93.

while the element fire consists of small “pyramids” (hexahedra). From the symmetry of the regular polyhedra, Plato tried to deduce all the physical properties of the elements, and then all the properties of the world. However much the Platonic realization of this project may seem to us today to be naïve, his philosophical postulates are striking in their boldness. In light of such considerations, contemporary physics’ theory of elementary interactions, which considers the attributes of symmetry to be fundamental (although its symmetries are symmetries of dynamics and not static symmetries like those of the regular polyhedra), is one more attempt to implement Plato’s program.

6 The Achievements of the Platonic Philosophy of Nature

So let us now mention a few of the achievements of Platonic philosophy that have had the greatest impact on later thought about nature.

1. The extension of Socratic thought about essence to all kinds of beings. From then, for many centuries, philosophy would try to ignore the contingent and to concentrate its attention on that which is necessary. Nevertheless, the recognition of certain beings as necessary and others as contingent would change from one philosophical system to another.
2. The condition of the existence of “things cognizable by the senses” (shadows) is the existence of the Ideas. The Ideas “harmonize” their shadows. The discovery of the existence of things different from those affirmed by the senses became the foundation for nearly all of metaphysics, though not all metaphysicians understood that existence in a Platonic way (i.e., as the existence of Ideas).
3. The theory of Ideas applied to “mathematical beings” created the first philosophy of mathematics (if one does not count the still relatively primitive speculations of the Pythagoreans), and the “theory of shadows” became the first attempt to explain why nature is mathematical.
4. The Ideas harmonize their shadows, but it is the shadows that exist now (“become”), because they have been created. With the doctrine of creation began to appear the distinction, later so fundamental to philosophy, between a necessary being and contingent beings.
5. In Plato’s writings, the problems of time and space became the traditional problems with which every system of the philosophy of nature had to reckon. In discussing Plato’s philosophy of time, it is worth taking note of the possibility of the existence of the atemporal (the persistence of the Ideas).
6. The Platonic theory of symmetry and its role in the reconstruction of the structure of the world—though long passively repeated and then forgotten—has undergone a surprising revival in theories of contemporary physics. Is this just a case of accidental convergence? Or does the relationship between Platonism and the contemporary mode of thought have deep roots? Perhaps further chapters will shed some light on these questions.

Biographical Notes

Socrates (469–399 BC), Greek thinker. He walked through the streets and squares of Athens with a conviction about his divine mission to teach people to care for their own souls. Together with the contemporary Sophists, he initiated philosophical inquiry into the problems of man and morality. He was accused by the Athenians of “the introduction of new gods and the corruption of the youth” and was condemned to death. He did not leave any writings behind him; Socrates’ teachings, above all in the area of ethics, were transmitted by his disciples, chiefly by Plato. Socrates became the paradigm of a philosopher who lives according to the truth that he teaches and is prepared even to give his life for it.

Plato (c. 427–c. 347 BC), Greek philosopher. He probably came from a noble Athenian family which took an active part in the political life of Athens. After 399 BC, he left Athens and went to Sicily, where he encountered the Pythagoreans. On his return to Athens he founded (c. 387 BC) his Academy, the famous school which operated until its closure by the Emperor Justinian in 529 AD. He constructed an idealist philosophical system based on the primacy of immutable, eternal ideas over material beings. Plato’s views had a great influence on European theology, politics, ethics, metaphysics, and logic; in particular, Plato had an influence on European philosophy of nature, founding a tradition according to which nature can be subjected to mathematical analysis. An expression of that is the inscription which was reportedly placed above the entrance to the Academy, forbidding entry to those who did not know the arcana of geometry.

Theaetetus (c. 414–c. 369 BC), Greek mathematician. He was a friend of Plato, who named one of his dialogs after Theaetetus. Probably Theaetetus contributed to the development of Euclid’s theory of irrational numbers and also played a role in the development of stereometry.

Appendix: Platonism’s “Ideas” in the History of Western Philosophy

Plato is one of the most influential thinkers in the history of philosophy. It is worth recalling Whitehead’s remark that the Western philosophical tradition consists of a series of footnotes to Plato. As usually happens in such situations, the doctrine of a great thinker undergoes various transformations, sometimes taking it quite far from the original. All the more since—as is now well known—a significant part of Plato’s doctrine was never written, but was passed down by oral tradition, which of course had an influence on its development and therefore on the changes that it underwent.

At the beginning of the Christian era, classical *Platonism* took the form of *Neo-Platonism* (Plotinus, Porphyry). That philosophy combined the thought of Platonism with elements of the doctrines of the Pythagoreans, of Aristotle, of the Stoics, and also of Eastern *gnosis*. The construction of Christian theology by early Church authors and Fathers (Origen, Pseudo-Dionysius, St. Augustine) was based primarily

on Platonism and often on its Neo-Platonic version. That assured the dominance of thought connected to Plato towards the end of antiquity and in the first phase of the Middle Ages. In the thirteenth century, as a result of contacts with *Islamic* philosophy and thanks to the work of such scholars as St. Albert the Great and St. Thomas Aquinas there was a return to *Aristotelianism*.

As we saw, the Platonic philosophy of nature put a great emphasis on the use of *mathematics* in inquiry into the world. At the end of the Middle Ages and at the beginning of the modern period alongside the general growth of interests in ancient culture, the use of mathematics became the reason for ever more frequent appeals to Plato's thought. Galileo, Kepler, Newton, and the other creators of modern physics (most explicitly, Kepler) readily referred to Plato, although in their research they connected mathematical analyses with the conduct of controlled experiments, which brought them even nearer to the tradition of Archimedes than it did to that of Plato.

The later growth of empiricist and positivistic tendencies reduced the interest of scientists in their philosophical roots. But not for long. The successes of mathematized physics could not help but raise questions about why applying mathematics in inquiry about the world is so effective. One of the positions on this question most widely held among mathematicians and theoretical physicists is the so-called *Platonic position*. Roughly, it holds that objects or mathematical structures exist objectively and independently both of the material world and of our cognition. Between that Platonic world and the physical world exists a *correspondence*, as a result of which, by inquiry into mathematical structures (to which experience points or which it *ex post* confirms), we can get information about the structure of the physical world. It is not necessary to add that many versions and varieties of that kind of Platonism exist. It is also certain that—besides the most general intuitions—they do not have very much in common with the original thought of Plato. In particular, Plato did not simply identify his world of Ideas with the world of objects or of mathematical structures, as Platonizing physicists and mathematicians generally do.

It should be mentioned that in addition to the *Platonizing* positions in the philosophy of science (and in particular in the philosophy of mathematics), there exist doctrines that are often called *anti-Platonic*. These are often associated with various forms of empiricism.

Among the strongest adherents of Platonism in the philosophy of science are the mathematician and logician Kurt Gödel and the mathematician and theoretical physicist Roger Penrose.

Gödel wrote: "It seems to me that the assumption of such [sc., mathematical] objects is quite as legitimate as the assumption of physical bodies."¹⁷

Penrose wrote: "My sympathies lie strongly with the Platonistic view that mathematical truth is absolute, external, and eternal, and not based on man-made criteria; and that mathematical objects have a timeless existence of their own, not dependent on human society nor on particular physical objects."¹⁸

¹⁷"Russell's Mathematical Logic," ed. P. A. Shilpp, *The Philosophy of Bertrand Russell* (LaSalle: Open Court, 1989), 123–154, at 137.

¹⁸*The Emperor's New Mind: Concerning Computers, Minds and the Laws of Physics* (New York: Oxford University Press, 1989), 116.



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