Roman S. Kljujkov, Sergey F. Kljujkov

PLATO’S PHILOSOPHY OF COGNITION BY MATHEMATICAL MODELING

ABSTRACT

By the end of his life Plato had rearranged the theory of ideas into his teaching about ideal numbers, but no written records have been left. The Ideal mathematics of Plato is present in all his dialogues. It can be clearly grasped in relation to the effective use of mathematical modeling. Many problems of mathematical modeling were laid in the foundation of the method by cutting the three-level idealism of Plato to the single-level “ideism” of Aristotle. For a long time, the real, ideal numbers of Plato’s Ideal mathematics eliminates many mathematical problems, extends the capabilities of modeling, and improves mathematics.

**Keywords**: modeling; theory of ideas; eidetic numbers; Ideal mathematics.

INTRODUCTION

According to Aristotle’s suggestion it is asserted that Plato rearranged mathematically the theory of ideas into the theory of the world, modeling by means of ideal numbers only at the decline of his life. According to Friedrich Schleiermacher, the fundamentals of Plato’s theory were formulated in his green years, while his *Dialogues* were written, according to the plan of the compilation of an integral theory. Karl Hermann supposed that Plato’s views changed during his lifetime. We can see mathematical modeling even in Plato’s early works. Still, Plato expresses it quite vaguely: *dymonium* in the *Theages*, the prayer in *Second Alcibiades*, patriotism in the *Menexenus*. In the *Theages,* intuition, naïve realistic knowledge was articulated; in the *Apology of Socrates*, a special philosophical knowledge, while in the *Lysis —* a causative row, leading to a universal origin, to ideal cognition were articulated.

Running slightly ahead, in order to prevent some unclear understanding (may be Plato’s as well?) of his terms, we shall introduce now, a three-level scheme of his ideas, proposed by the authors:

— Ideas(ideas)—the “mortal” generalization of all things, comprehensible for people.

— Ideals(ideas’ ideas)—immortal generalizations of ideas noteasily comprehensible.

— Ideal mathematics(The idea of ideas’ ideas)—a generalization of all ideals, comprehensible to God only.

Even early Plato could clearly see the visible difference of his categories from normal mathematics—he discerned Ideal mathematics: in “Мenon” - the principle of exact science, rather than abstract notions. In his “Συμπόσιον” Plato showed that the things tend to their limits, from bodies to souls, from souls to sciences (idea?), from sciences to the limit of all sciences, to the idea of the beautiful (an ideal?), not susceptible to alternations and existing eternally [210а–212а]. In each consecutive dialogue we can see more and more unusual Ideal mathematics. Gradually, a structure becomes visible in a new structure, and it is a numerical structure. Slowly, but steadily “ideal,” eidetic numbers are revealed. They, however, differ from mathematical numbers, they are more original, more principal than even his ideas, and they are a basis of ideas, their form, structure and their sense (an ideal?).

The top of Plato’s categories comprehension by means of mathematical structure is in his *Parmenides*, where a possibility of not only a reasonable comprehension of things is substantiated, but also a possibility of naturally giving birth to them, by means of mathematical modeling, through material and sensible relations. For this purpose, Plato reduces the theory of ideas to maximal generalization with the categories of “Single” and “Other,” with an analysis of their ultimate properties (Ideal mathematics?), though he does not present numerical examples. As a result we have got numerous discrepancies, misunderstanding and contradictions in interpretation and even hostile reaction to his theory.

We have come to Plato with a bunch of numerical examples, with efficient algorithms and mathematical models, thus offering a help to Plato. We added in our arsenal ten direct and some reverse ideal numbers (ideals) of Plato; numerical regularities of his Ideal mathematics; and finally, lots of ideas***,*** discovered by ordinary mathematics during the course of its development. We hope to offer a deeper understanding of Plato, by means of this ‘trick”.

It is usually considered[[1]](#footnote-1)  that the main essence of the *Sophist* is dedicated to the dialectics of such notions like “existence” and “non-existence”, entwined into *eidos*, the whole *Parmenides* is dedicated to the dialectics of notions of “Single”and “Other*”* (i.e. something abstract, simpler than the original *eidos*) in Ideal mathematics. The reason, however, that Plato devotes two important dialogues to the description of a hard to describe logical system of dialectics, is universally ignored. The participants of the dialogue in the *Sophist*, however, from the very beginning, try to give a definition to the sophist and point out: “we are bound to meet the necessity to admit that lies and mistakes really exist.” And then follows the main content of the two dialogues.

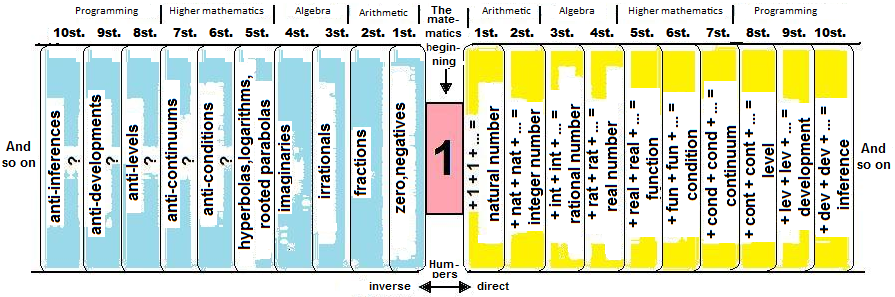
A confusion was caused by some lies and mistakes which likely happen in knowing the world. Plato was aware of the truth of any human mind comprehension. He could see it only in *eidoses* and in Ideal mathematics. Unfortunately, he is unable to show them. Is he unwilling to do so? So, he tries to resort to an ultimate and difficult step—a proof of a possibility of the real existence of *eidoses* and Ideal mathematics, by means of purely clear dialectic logics of distinguished notions. Thus, Plato tries to describe convincingly, what he is unable to show. Or is he unwilling to do it?

But when *eidoses* and Ideal mathematics are already standing before our eyes in their numerical real variants, Plato’s theory becomes comprehensible and understandable, and is fruitfully applicable in mathematical modelling, without these sophisticated proofs. The application allow us to compare it with the properties and revelations discovered by Plato, when he proves their existence in the *Sophist* and the *Parmenides*.

Then it is not difficult to represent all that is generated by ordinary mathematics as ideas, Plato’s mathematical numbers, as mathematicians really generalize and effectively model numerous real objects and phenomena.

It is difficult, however, to represent ideals as a reality. Plato, himself, had doubts, regarding their attainability and the possibility to cognize them. We have been taught since childhood that there are no ideals in the world. But they happen to exist! They are few as they generalize the multitude of ideas, generated by mathematics. And they even have given birth to ideas. In other words, mathematicians create newer and newer ideas, deliberately gazing with their minds at singular, eternal and constant ideals of the Ideal mathematics. To be more precise, mathematician are capable of doing it when they believe in their existence. So far, they generate ideas, using a good, old method, prescribed by Aristotle, they analyse numerous real things and phenomena, occasionally discovering the indicated ideals. They call their way of knowing intuition. You can judge which method is simpler.

The regularities between “separate” ideals, discovered by the Ideal mathematics of Plato, pictured in the Figure (below) of the development of the Ideal mathematics seem to be quite unreal. Those regularities, however, allow for creating mathematics forever. They are extremely simple, beautiful and fruitful. We believe that Plato described them intuitively in his *Parmenides* with categories of Single and Other, with the principle concerning all eidetic and all non-eidetic, and with the principle of principality. “This supernatural, unthinkable, sophisticated and inexpressible “Single” is a principle of both existing and mental, of both mind and word.”[[2]](#footnote-2)



**Figure. Ideal mathematics (1997): Plato’s “Single” and “Other” (4th century B.C.)**

Plato finishes creating the conception of cognition of the world in a dialogue in the *Parmenides*. In the *Philebus* Plato defined cognition as a synthesis, mixing up and confusion, determining it as a mathematical model, giving the origin to the world of ideals. The Ideal mathematics is characterized by many flattering epithets, like “reason” (space and over space), “wisdom,” “the king of Earth and the sky,” “Zeus” [28b–30d] and, finally, “virtue” [65a]. The nature of the Ideal mathematics differs from everything, being in everything; it does not need anything, it is all-sufficient [60b–c, 61a-b, 64a–b, 65a].

*The Republic* supplements: “The good—this is a beginning or principle that transcends assumption” [510b], “is not essence but still transcends essence in dignity and surpassing power”. [509b]

“As the good is in the intelligible region to reason and the objects of reason, so is this in the visible world to vision and the objects of vision [...] then, that gives their truth to the objects of knowledge and the power of knowing to the knower, you must say is the ideaof good, and you must conceive it as being the cause of knowledge, and of truth in so far as known”. [508c–e]

So, Plato, having spent so much effort on the description of the qualities of the Ideal mathematics and having used numerous epithets and flattering characteristics, finally, raises the curtain and shows it in all its simplicity.

“And knowledge (what every person must learn first of all) is but a trifle, it is necessary to discern what is one, two and three. (He knows only three ideals, natural, integer, rational? Or, is he speaking of three levels: ideas, ideals, Ideal mathematics?) I call it the Number and calculation. Any art and knowledge has to be associated to it. Due to its nature [(Ideal?) mathematics] leads a man to reflection, but nobody use it as a science, leading us to being (Truth?)” [VII, 518c, d]

We are not going to resort to all parallels between Plato’s Ideal mathematics, proposed by us and the philosophy of cognition of Plato. An attentive reader will find and compare the properties of Plato’s dream to the possibilities of the real structure of our days, seen by Plato and what we can see nowadays. It will help him understand both the structure and Plato and apply efficiently such knowledge to solving problems of his own. We shall mention obvious coincidence.

Plato saw *eidos* not as a static, plane structure, but as a source of being (direct numbers and operations). So, *eidos* is constantly renewed and differs from itself, remaining the same thing. *Eidos* is “a singularity of mobile rest of self-identical difference.” [156e–157b] This odd set of contradictions and mutually destroying assertions is the most difficult to understand in Plato[[3]](#footnote-3)—but is logically immaculate, having mathematical reliability and fully corresponding to the scheme of development of Plato’s Ideal mathematics.

Aleksei F. Losev writes:

“By throwing away from *eidos* not only sensible, but also the notion content we will get some ‘Single,’ some singularity or even some Unit, but nothing more, not the ‘*nicht-Ich,*’ that Fichte got, not Hegel’s ‘being,’ not Schelling’s nothing, but ‘Single’ lies at the basis and the origin of entire dialectics. Have a look at the proposed scheme of the development of Ideal mathematics (Figure). In its center there is really an original unit! […] And it is all direct; ideal numbers grow from this unit in direct operations (in the right direction), while in reverse operations (in the left direction) are diminished up to the unit itself—‘being.’ When each reverse operation is performed on this unit, then reverse ideal numbers are formed behind it (in the left direction). They are formed separately, not jointly in a multitude with the direct ones—‘not being.’ All categories seem to surround the ‘Single,’ fringing with it, forming concentric circles around it.”[[4]](#footnote-4)

This description[[5]](#footnote-5) of Plato’s creation represents quite adequately our scheme of the development of Ideal mathematics.

Plato’s Ideal mathematics in our scheme arranges itself, like in the *Philebus* and *The Republic*, without axioms, by a multi-staged addition of units, and its ideal numbers generalize all discoveries of normal mathematics and programming, modeling all knowledge of mankind.

Just listen to Plato:

“The idea of Virtue (Ideal mathematics?— RK,SK) is the limit, it is hardly discernable, but as soon as you discern it , in the domain of the visible it gives birth to light and its Lord and in the domain of the cognizable it is the Lord, and the Truth and understanding depend on it.” [[6]](#footnote-6)

Do mathematical modeling in accordance with Plato’s prescription—this is the only way to the Truth!

CONCLUSION

Philosophyof cognition as Plato’s imagination is represented by the scheme of the development of Ideal mathematics, by real, ideal numbers. The comparison facilitates understanding of Plato’s idealism and allows for its efficient use modern mathematical modeling.

ABOUT THE AUTHORS — Pryazovskyi State Technical University.

The most significant paper: R.S. Kljujkov, S.F. Kljujkov. 2013. Ideal Plato’s Saarbrücken: LAMBERT Academic Publishing,

[https://www.lap-publishing.com/catalog/details//store/gb/book/978-3-659-45724-1/Идеальная-математика-Платона](https://www.lap-publishing.com/catalog/details/store/gb/book/978-3-659-45724-1/%D0%98%D0%B4%D0%B5%D0%B0%D0%BB%D1%8C%D0%BD%D0%B0%D1%8F-%D0%BC%D0%B0%D1%82%D0%B5%D0%BC%D0%B0%D1%82%D0%B8%D0%BA%D0%B0-%D0%9F%D0%BB%D0%B0%D1%82%D0%BE%D0%BD%D0%B0)

Emails: [sklujkov@gmail.com](mailto:sklujkov@gmail.com)

1. Losev, A. F. 1993. *Otczerki antitcznobo simbolisma i mitologii,* Moskva: Mysl. [↑](#footnote-ref-1)
2. Ibid. [↑](#footnote-ref-2)
3. Ibid. [↑](#footnote-ref-3)
4. Ibid. [↑](#footnote-ref-4)
5. Ibid. [↑](#footnote-ref-5)
6. *The Republic* [509d] [↑](#footnote-ref-6)