MATHEMATICS AS THE KEY TO A HOLISTIC WORLD VIEW: THE CASE OF PAVEL FLORENSKY

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It is well known that Pavel Florensky highly praised mathematics throughout his life. Let us take his letter of 12 November 1933 to his daughter Olga as an example: «Mathematics should not be a burden laid on you from without, but a habit of thought[1]: one should be taught to see geometric relations in all reality and to discover formulae in all phenomena»[2]. But God is in the details, the saying goes, so it is worth specifying Florensky's ideas on the subject. In this paper, I will attempt to reconstruct the main strands of his rather ambitious project concerning mathematics.

A body of literature on the topic is far from being rich and exhaustive. Around 1987, some of Aleksei Losev's amazing reminiscences of Pavel Florensky were recorded and eventually published in 1990. Losev talked about "identity of philosophy and mathematics" in Florensky and insisted on Florensky's "great discovery" that mathematical objects are perceptional and alive[3]. The discussion was initiated by 1985-1989 publications by Sergei M. Polovinkin on Florensky's «philosophical-mathematical synthesis»[4] and by Sergei S. Demidov (joined in the 1990s by Charles E. Ford) on Florensky's place in the history of mathematics[5]. I have been taking part in the discussion

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[1] The previous part of the sentence is given in Avril Pyman's translation. See A. Pyman, *Pavel Florensky: A Quiet Genius*, Continuum, New York 2010, 160.

[2] P. Florensky, *Sochinenija v 4-kh tomakh* [*Selected Works in 4 Volumes*], Mysl', Moscow 1994-1999, vol. 4, 39.

[3] Cf. *P.A. Florenskij po vospominanijam A.F. Loseva* [*Pavel Florensky in Aleksei Losev's reminiscences*], in *Kontekst 1990: Literaturno-teoreticheskie issledovanija*, Nauka, Moscow 1990, 6-24. Reprinted in K.G. Isupov (ed.), *P.A. Florenskij: pro et contra*, Russkij Khristianskij gumanitarnyj institute, Saint-Petersburg 1996, 173-196; 2nd ed. 2001, 173-195.

[4] S.M. Polovinkin, *P.A. Florenskiĭ: Logos protiv Khaosa* [*Pavel Florensky: Logos vs. Chaos*], Znanie, Moscow 1989, reprinted in K.G. Isupov (ed.), *P.A. Florenskiĭ: pro et contra*, 1996, 625-648; 2nd ed. 2001, 621-644.

[5] Cf. S.S. Demidov, *O matematike v tvorchestve P.A. Florenskogo* [*Mathematics in Creative work of Pavel Florensky*], in A.G. Barabashev - S.S. Demidov - M.I. Panov (eds.), *Metodologicheskij analiz zakonomernostej*

since 1996[6]. Recently, the topic became popular owing to Loren Graham and Jean-Michel Kantor's *Naming Infinity* (2009)[7]. Unfortunately, until now, most of the contributions have been based on the accidental or limited selection of sources taken as evidence of Florensky's activities at the meeting point of mathematics and religious philosophy or his reflections on the topic. It still prevents us from drawing accurate and balanced conclusions, so, first, we need to gain a panoramic vision.

1. Mathematical idealism

In 1900, Pavel Florensky chose the Mathematics Department of the Faculty of Physics and Mathematics when applying to Imperial Moscow University. He could have chosen the Science Department of the same Faculty, following the main passion of his school years – investigation of the natural world – or the Faculty of History and Philology in conformity with his deep philosophical longing and fondest ambition of his student years: constructing the holistic world view. But, he decided to get special mathematical training first.

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razvitija matematiki [*Methodological Analysis of Patterns in the Development of Mathematics*], VINITI, Moscow 1989, 72-85, also in M. Hagemeister - N. Kauchtschischwili (eds.), *P.A. Florenskij i kul'tura ego vremeni - P.A. Florenskij e la cultura della sua epoca: atti del convegno internazionale, Università degli studi di Bergamo, 10-14 gennaio 1988*, Blaue Hörner, Marburg 1995, 171-184; S.S. Demidov - C.E. Ford, *On the Road to a Unified World View: Priest Pavel Florensky - Theologian, Philosopher and Scientist*, in T. Koetsier - L. Bergmans (eds.), *Mathematics and the Divine: A Historical Study*, Elsevier, Amsterdam 2005, 595-612.

[6] Cf. V. Shaposhnikov, *Tema beskonechnosti v tvorchestve P.A. Florenskogo* [*The Topic of Infinity in Pavel Florensky's Creative Work*], in A.G. Barabashev (ed.), *Beskonechnost' v matematike: filosofskie i istoricheskie aspekty* [*Infinity in Mathematics: Philosophical and Historical Aspects*], Janus-K, Moscow 1997, 362-389; V. Shaposhnikov, *Filosofija geometrii Pavla Florenskogo v kontekste ego uchenija o prirode chelovecheskogo poznanija* [*Pavel Florensky's Philosophy of Geometry Being Considered in the Context of His Doctrine of the Nature of Human Knowledge*], in *Istoriko-matematicheskie issledovanija* 5(40) (2000), 83-111; V. Shaposhnikov, *Matematicheskaja apologetika Pavla Florenskogo* [*Pavel Florensky's Mathematical Apologetics*], in V.N. Porus (ed.), *Na puti k sinteticheskomu edinstvu evropejskoj kul'tury: Filosofsko-bogoslovskoe nasledie P.A. Florenskogo i sovremennost'* [*On the Way to Synthetic Unity of the European Culture: Pavel Florensky's Philosophical-Theological Heritage and the Present*], BBI, Moscow 2006, 164-180; V. Shaposhnikov, *Kategorija chisla v konkretnoj metafizike Pavla Florenskogo* [*Number as a Category in Pavel Florensky's Concrete Metaphysics*], in A.N. Krichevets (ed.), *Chislo: Trudy Moskovskogo seminara po filosofii matematiki* [*Number: Moscow Studies in the Philosophy of Mathematics*], MAX Press, Moscow 2009, 341-367, reprinted with minor corrections in A.N. Parshin - O.M. Sedykh (eds.), *Pavel Aleksandrovich Florenskij*, ROSSPEN, Moscow 2013, 315-354; V. Shaposhnikov, *"Plotskost' mysli": K filosofii matematiki o. Pavla Florenskogo* [*"Materiality of Thought": Father Pavel Florensky's Philosophy of Mathematics*], in *Istoriko-matematicheskie issledovanija* 14(49) (2011), 242-265.

[7] Cf. L. Graham - J.-M. Kantor, *Naming Infinity: A True Story of Religious Mysticism and Mathematical Creativity*, Harvard University Press, Cambridge 2009. See also a highly critical review caused by the Russian translation (2011) of this book: V.A. Bazhanov, *Mozhno li utverzhdat' nalichie evristicheskogo vlijanija imjaslavija na matematiku?* [*Is It Possible to Confirm an Influence of Name Worshipping on Mathematics?*], in *Voprosy istorii estestvoznanija i tekhniki* 3 (2012) 124-133.

«What I have wanted to get from mathematics since the second form, I am, little by little, starting to get now, and I am quite sure to get more than I expect and hope to», Florensky wrote to his mother on 5 October 1900[8], at the very beginning of his way through university. What did Pavel Florensky expect to obtain with the help of mathematics since his childhood? What kind of possibilities did he hope to realize through the in-depth study of this very part of human knowledge? He went on in the same letter to his mother:

> «For me, mathematics is the key to a world view, such a world view for which there would be nothing so unimportant as not to be worth studying and nothing that was not linked to something else[9]. In the case of a *mathematical* world view, there is no need to neglect (whether unconsciously or on purpose) whole regions of phenomena, to crop or extend reality. Natural philosophy forms a unity with ethics and aesthetics. Religion obtains a very special meaning and gets a unique place within the whole, the place it was devoid of before. That is why it had to build its own detached house»[10].

Here, Florensky obviously stresses the *unifying* and *consolidating* functions of mathematics toward a world view, though we still do not know how this general idea can be put into practice. In his third year at university, Florensky created a sort of manifesto on the subject, known under the draft title *A Speech Outline* (1902)[11]. Mathematics, according to it, studies «the prototypes of all sorts of relations between entities (*prototipy vsijakikh otnoshenij mezhdu bytijami*)». That is why «[m]athematical laws, having the most general categories of unity and plurality as their principles, must be the most applicable to everything, grasping any data in the widest range: in short, they must reign over any given material»[12]. Mathematics is *regina scientiarum* but only *de jure*, not *de facto*. Florensky seeks to change this situation.

Mathematics «should and can be the foundation for a world view; it means not to obscure concrete visuality of physics with symbols but to concretize and substantialize the symbols of mathematics»[13]. To illustrate this idea, Flo-

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[8] P.V. Florensky (ed.), *Obretaja Put': Pavel Florenskij v universitetskie gody. V 2-kh tomakh* [*Entering the Way: Pavel Florensky in His University Years, in 2 Volumes*], Progress-Traditsija, Moscow 2011-2015, vol. 1, 175.

[9] Avril Pyman's translation is used here. See A. Pyman, *Pavel Florensky*, 27.

[10] P.V. Florensky (ed.), *Entering the Way*, vol. 1, 175.

[11] Cf. P. Florensky, *Chernovik vystuplenija na otkrytii studencheskogo matematicheskogo kruzhka pri Moskovskom matematicheskom obshchestve* [*A Draft of the Speech at the Opening of the Student Mathematical Circle under the Moscow Mathematical Society*], in *Istoriko-matematicheskie issledovanija* 32-33 (1990) 467-473. Author's title for this draft was *Plan rechi* [*A Speech Outline*]. In fact, the speech was never made. The draft is reprinted in P.V. Florensky (ed.), *Entering the Way*, vol. 2, 15-18.

[12] P. Florensky, *A Draft of the Speech*, 470.

[13] *Ivi*, 471.

rensky used an analogy borrowed from the field of mineralogy: he compares mathematics to a *hydrophane*, a variety of opal that becomes translucent or transparent (and hence very beautiful) upon immersion in water. Mathematics is now like an unattractive dry piece of hydrophane opal, and it should be "saturated with the water of concreteness". «The base and the fine structure remain unchanged, precision and profundity are preserved, but it turns from a system of symbols, which is taken purely superficial and formally rational, to a whole, which reason has made transparent throughout»[14].

> «A formula cannot and should not stay just a formula. It is a formula of something; the richer the associations connected with the formula for us, and the more versatile is its real substance, the better is our understanding of it, and the more harmoniously associated concrete phenomena are consolidated into a viable organism of ideas – a world view».[15]

A modern way of doing mathematics, according to Florensky, is no more than "building up a collection of skeletons". «Let this valley of bones be covered with that which enables them to move and act, let the potential formulae turn into the actual ones […]»[16]. Surely, we have here an allusion to Ezekiel 37:1-10[17]. These "dry bones" of abstract mathematics should be covered with the "flesh" of concreteness. Then, we will gain «such a holistic world view that has mathematics at the core of it»[18].

In *A Speech Outline*, Florensky apparently made no difference between the Divine mathematics and the human mathematics. His project is to view phenomena as organized according to the framework of abstract mathematics seen as an already given system of eternal prototypes. Here, the concretization of mathematics means no more than the wealth of interpretations associated with some given abstract formula. This position can be fairly characterized as idealistic and Platonic.

Available data make us admit that even when Florensky was applying to the Mathematics Department, becoming a professional mathematician in the narrow sense of the word was never an intention of his. In-depth studies of pure mathematics were supposed to be a step on his way to fulfilling a much broader philosophical task. This task proved to be a complicated challenge to cope with

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[14] *Ibidem*.

[15] *Ibidem*.

[16] *Ivi*, 471-472.

[17] Cf. N.K. Bonetskaya, *Russkij Faust XX veka* [*Russian Faust of the 20th Century*], Rostok, Saint Petersburg 2015, 21.

[18] P. Florensky, *A Draft of the Speech*, 472.

throughout his life. Summing up his course of life in the self-synopsis (about 1925-26) he wrote: «F[lorensky] sees his life task in paving the ways to the forthcoming holistic world view»[19].

The decisive role in choosing mathematical education as the basis is likely to have been played by his passion for Plato's philosophy. According to the above-cited letter to his mother from 5 October 1900, his admiration for Plato began in his senior year of high school, just before his application to the university[20]. For it was Plato in his famous dialogue the *Republic* who insisted that the way to the heights of philosophical speculation went through mastering mathematical disciplines – arithmetic, geometry, music and astronomy[21].

Mathematics serves as a foundation for many of Florensky's works, which at first sight may seem to have nothing to do with them. He wrote about his most famous theological work *The Pillar and Ground of the Truth* (version 1 - 1908, version 2 - 1913):

> «An attempt is being made here to apply a number of mathematical concepts and operations, even without naming them, so to say, in a digested form, to general issues of a world view, to problems of spiritual life, and to use for philosophical purposes the very spirit of mathematics, putting the mathematical techniques aside as far as it is possible»[22].

In the self-synopsis, he put the idea that way: «F[lorensky]'s worldview has been formed mainly on the basis of mathematics and it is run through by mathematical principles, although it does not use mathematical language»[23]. Nevertheless, it should be mentioned that Florensky often enough relied not only on a mathematical spirit but on the special symbolism of mathematics as well, which can easily be confirmed by closely reading *The Pillar* (see section 3 below), as well as some other papers of the period: *On the Types of Growth* (1905, published 1906)[24], *Immanuel Kant's Cosmological Antinomies* (1908, published 1909) and *The Limits of the Theory of Knowledge* (1908-1909, published 1913)[25].

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[19] P. Florensky, *Selected Works*, vol. 1, 38.

[20] Cf. P.V. Florensky (ed.), *Entering the Way*, vol. 1, 175-176.

[21] Cf. 521d-534e, see Plato, *Complete Works*, ed. by J.M. Cooper, Hackett Publishing Company, Indianapolis 1997, 1138-1150.

[22] See Hierodeacon Andronik (Trubachev), *O tvorcheskom puti svjashchennika Pavla Florenskogo* [*On the Creative Career of the Priest Pavel Florensky*] (1982), in K.G. Isupov (ed.), *P.A. Florenskij: pro et contra*, 1996, 515. These words are taken from the inscription on a copy of *The Pillar* of 9 February 1914 to Petr A. Alferov, one of Florensky's pupils at the Moscow Theological Academy in the 1911-12 academic year and his colleague at the Red Cross. Florensky made a copy of this inscription for himself.

[23] P. Florensky, *Selected Works*, vol. 1, 40.

[24] Cf. *ivi*, 281-317.

[25] Cf. *ivi*, vol. 2, 3-60.

In his 1921 *curriculum vitae*, Pavel Florensky used the term "mathematical idealism" to characterize his position toward mathematics in his last school years and while entering the university:

> «In those years of my youth, my deeply held conviction that might be called mathematical idealism had grown and gained a foothold: all possible ontological regularities [*zakonomernosti bytija*] are already contained in pure mathematics as the first concrete (and thus ready for use) self-disclosure of the principles of thought. In connection with this conviction, a demand to construct a philosophical world view based on in-depth mathematical knowledge had emerged»[26].

2. Catharsis and mathematical apologetics

Pavel Florensky believed that his studies of mathematics, alongside his studies of philosophy, substantially contributed to his turning to the Orthodox Church. This assertion of his proved to be a great surprise for his schoolmate, Alexander Elchaninov, as early as November 1900[27]. Florensky repeated the same idea writing to his mother on 3 March 1904[28]. What could mathematics have to do with the conversion of the priest-to-be Florensky?

There is a hint of such a peculiar approach to mathematical studies in a letter to his sister, Liucia, on 21 May 1904. He wrote that his personal studies had always been for him «not mere studies, but a sort of prayer»[29]. An unfinished prose poem of his, *Saint Vladimir* (1904), contains an episode in which a self-portrayed character named "mere contour (*tol'ko kontur*)" prays and thanks his Lord, being in ecstasy when the theorem he has been proving amazes him by its harmony and perfection[30].

Florensky's *Notebook 1904-1905* indicates the unrealized project to unite some of his early articles into the book titled *On Catharsis*[31]. It was to have included *On Superstition and Miracle* (1902-1903), *On Symbols of Infinity* (1904), *About One Assumption towards a World View* (1903-1904), a part of

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[26] Hierodeacon Andronik (Trubachev), *K 100-letiju so dnja rozhdenija svjashchennika Pavla Florenskogo* [*In Commemoration of the Centenary of the Priest Pavel Florensky's Birth*], in *Bogoslovskie trudy* 23 (1982) 266.

[27] Cf. P.V. Florensky (ed.), *Entering the Way*, vol. 1, 252-253.

[28] Cf. *ivi*, vol. 2, 543.

[29] *Ivi*, vol. 2, 608.

[30] Cf. E.V. Ivanova (ed.), *Pavel Florenskij i simvolisty: Opyty literaturnye. Stat'i. Perepiska* [*Pavel Florensky and the Symbolists: Literary Experiments, Articles and Correspondence*], Jazyki slavjanskoj kul'tury, Moscow 2004, 252-253.

[31] Cf. *ivi*, 335-336.

On the Empirical and the Empyrean (1904) (about sacraments and empirically unobservable transubstantiation)[32] as well as several never written articles on "discontinuity" and Cantor's theory of sets, inevitably involving metaphysical and religious implications. All the above-mentioned texts are united by mathematics in the core and vital religious problems on the periphery[33]. He wrote to Liucia on 7 September 1903: «heaps of articles, etc., hang above my head, articles from geology to mystical theory of knowledge (through mathematics, of course)»[34].

The word "catharsis" (purification) belongs to religious vocabulary and was connected initially with ancient Greek mystery tradition, and secondly with Greek medicine, theater and philosophy. For Florensky, it is mathematics that enables us to carry out philosophical catharsis, to break the wall dividing a man of modern culture and God by straightening out the realm of concepts.

In *Saint Vladimir*, Florensky portrayed himself ("mere contour") as a John the Baptist *sui generis*. To the question "Who are you?" he answers this way:

> «The voice of one crying in the wilderness. Prepare ye the way of the Lord. Make his paths straight. I am a preacher. Pay heed to my preaching. I am preaching catharsis. Repent ye, repent of your prejudices and predispositions. Wash them away with the waters of baptism, the spring waters of speculation, the cold waters. I baptize you with water unto speculation, preparing you to receive the Lord. […] Christ has ordained unworthy me to preach catharsis and to purge of prejudices and predispositions»[35].

In a letter to Vladimir Kozhevnikov, his friend and co-member in Novoselov's Circle, dated 27 August 1912, he wrote: «My scientific papers, mostly unpublished or existing in a rough sketch only, my "notebooks", etc., a bulky mathematical work and mathematical notes – all this is τὰ καθαρτικά, as I always mentally call it, clearing my soul of modernity»[36]. In this letter, Florensky described three stages of his spiritual life course: κάθαρσις, μάθησις, πράξις, that is to say, purgation, apprenticeship, and ascetic practice and a life full of divine grace. The stage of catharsis included his university years ("the Poem", i.e., *Saint Vladimir*, was characterized in the letter as indicating "the completion of cathartic period") and embraced his mathematical-religious works of

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[32] All papers just mentioned can be found in P. Florensky, *Selected Works*, vol. 1.

[33] Cf. V. Shaposhnikov, *Stekljannoe more* [*A Sea of Glass: Pavel Florensky's Early Papers and Russian Symbolism*], in P.V. Florensky (ed.), *Entering the Way*, vol. 2, 363-382.

[34] P.V. Florensky (ed.), *Entering the Way*, vol. 2, 384.

[35] E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 253-254.

[36] *Perepiska P.A. Florenskogo i V.A. Kozhevnikova* [*Correspondence between Pavel Florensky and Vladimir Kozhevnikov*], in *Voprosy filosofii* 6 (1991) 108.

those years. Theodicy (*The Pillar*) and anthropodicy (the very idea and some notes towards the future *The Philosophy of Cult*) seemed to Florensky two parts of the mathesis period, and praxis was thought to be waiting for him ahead, as he thought at the time. That was a little more than a year after he was ordained an Orthodox priest and about five years prior to the catastrophe of the Russian Revolution.

But the role of a John the Baptist *sui generis* was still his in the post-revolutionary years, as some of Florensky's later texts may convince a reader.

So, on 22 September 1918 in a letter to Bishop Theodore (Pozdeevsky), Florensky discussed the foundation of the Theological Higher School and described his supposed role in the project:

> «The main task I am to be given, according to the quality of my education, chiefly is "cathartica", i.e., the purgation of mind of false premises and the dogmas of modernity, the purgation of false science and false philosophy, for the students to learn to look at the spiritual realm, which is opened by the grace, with the single eye of their intellect. I could do something else, but for the sake of the cause, I should be doing what I have mentioned above. I believe students should be taught not this or that philosopher's system but have the very concepts to be straightened and thereby make Christ to come have an easier way to our soul ("make paths straight")»[37].

In introductory lectures to the course *Analysis of Perspective* in the Higher Art and Technical Studios (*Vkhutemas*) on 30 September 1921, Florensky claimed the artist to be «a single eye (ἁπλοῦς ὀφθαλμός of the Gospel [Matthew 6:22, Luke 11:34]) on the world, a clear eye of mankind to contemplate reality»[38]. The objective of his course he voiced as "to protect an artist philosophically". He explained the idea this way:

> «[A]rtistic perception can and should be taken care of for it not to be polluted with anything tendentious, with false views and theories, which are assimilated from the environment in a conscious, unconscious or semi-conscious manner, because theories are in the air, and we are imbued with their poison often without even noticing or knowing it»[39].

Here, once again, the same idea of catharsis may be found, based on philosophical implications of mathematical theories of space and time, which Flo-

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[37] S.M. Polovinkin, *Moskovskaja Dukhovnaja Akademija ot Fevralja k Oktjabrju 1917 goda* [*Moscow Theological Academy from February to October of the Year 1917*], in *Nachala* 4(10) (1993), 125.

[38] P. Florensky, *Stat'i i issledovanija po istorii i filosofii iskusstva i arkheologii* [*Studies on the History and Philosophy of Art and Archeology*], Mysl', Moscow 2000, 386.

[39] *Ivi*, 387.

rensky saw in the light of prophet Isaiah's call, repeated by John the Baptist (Matthew 3:3).

To gain a better understanding of mathematical studies as "cathartica", let us turn to the draft scheme of Florensky's own collected works made up by him in 1919[40]. In that scheme, the collection was opened by a volume of philosophical-mathematical works entitled *Negative Philosophy Features*. The term "negative philosophy" was adopted from Friedrich Schelling's *Philosophy of Revelation*[41]. Florensky interpreted Schelling's distinction between negative and positive philosophy in the following way: negative philosophy dealt with possibilities and impossibilities, while positive philosophy dealt with reality and unreality. Negative philosophy, Florensky went on, *was impossible without mathematics*. Apropos of this, Father Pavel used to cite the French physicist Francois Arago: «Whoever, apart from pure mathematics, pronounces the word "impossible" is wanting in prudence»[42]. These words, according to Florensky, still remain valid should the word "impossible" be replaced with the word "possible"[43].

In the 1908-09 academic year, Florensky made an attempt to deliver *Lectures on Encyclopedia of Mathematics* at the Moscow Theological Academy to future priests and theologians. «The course I am giving», Florensky tried to explain, «has a philosophical-apologetic character». He aimed not only to familiarize his students with main ideas and assertions of mathematics, but also

> «to apply mathematical concepts and propositions to *criticism* of methodological techniques, regulations, principles and basic concepts of modern science. It enables one to discover an unwarranted and fantastic character of a great many propositions of [modern science] that are considered to be true by the general public. And, thereby, the Encyclopedia of Mathematics becomes a ground for a new theological discipline just beginning to take shape that can be named mathematical apologetics»[44].

Mathematics possesses its apologetic resonance for Florensky, i.e., its capability of helping a person to join the Church, because of its emancipat-

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[40] Cf. P. Florensky, *Selected Works*, vol. 1, 701.

[41] Florensky named Schelling in this context. See: P. Florensky, *Zametki k lektsijam po entsiklopedii elementarnoj i vysshej matematiki* [*Lecture Notes on the Encyclopedia of Elementary and Higher Mathematics*] (1919), a manuscript, 22.

[42] «Celui qui, en dehors des mathématiques pures, pronounce le mot *impossible*, manque prudence». See F. Arago, *Bailly* (1844), in *Oeuvres complètes*, t. 2: *Notices biographiques*, Gide & J. Baudry, Paris 1854, 313.

[43] Cf. P. Florensky, *Lecture Notes on the Encyclopedia* (1919), 22.

[44] P. Florensky, *Objasnitel'naja zapiska k programme po entsiklopedii matematiki* [*An Explanatory Letter to the Encyclopedia of Mathematics Programme*] (1909?), a manuscript.

ing power, resisting hypnotizing claims of the so-called "proven by science" type. The practice of rigorous mathematical reasoning and strict explication of premises for any conclusion make one adequate in assessing the real status and weight of a scientific proposition. Mathematics sets us free from predispositions related to our ideas as to the boundaries of the possible and impossible (which is the very task of negative philosophy): «mathematics provides us with the solution to *what is thinkable and what is unthinkable in the realm of patterns and schemes*»[45].

This emancipation from prejudices and predispositions, for which mathematics was crucial, turned out to be the straightening of our way to God as the Truth. According to Florensky, we initially seek after God as the Absolute Truth and only then as the Eternal Beauty and the Perfect Goodness. That is why Florensky, on his way to the Church, constructed the vindication of God (theodicy) through the epistemological aspect supported by "the very spirit of mathematics".

3. Mathematics as the source of paradigmatic examples in The Pillar

The crucial point in the inner logic of *The Pillar* is reached when (in Letter Three) we should abandon the sphere of rationality in a leap of faith to obtain it again on a new level within a new reason. In this very point, according to Florensky, mathematics lends us a hand, showing a possibility of such a transition and giving a paradigmatic example of it. In the first version of *The Pillar* (1908)[46] mathematics entered the discussion in the form of a digression on irrational numbers, which was introduced as an example of «a suprarational synthesis»[47]. In the second version (1913), the digression was supplied with two additional paragraphs and removed from the main text to the supplements as chapter xvii[48].

In the conceptual framework of *The Pillar*, truth is antinomy for the sinful rational mind. All rational antinomies are reducible to the central one, the

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[45] P. Florensky, *Lektsii po entsiklopedii matematiki* [*Lecture Notes on the Encyclopedia of Mathematics*] (1908-1909), a manuscript, 4.

[46] On the versions of *The Pillar* see: Hieromonk Andronik (Trubachev), *Teoditseja i antropoditseja v tvorchestve svjashchennika Pavla Florenskogo* [*Theodicy and Anthropodicy in Creative Work of the Priest Pavel Florensky*], Vodolej, Tomsk 1998, 54-56.

[47] P. Florensky, *Stolp i utverzhdenie Istiny (Pis'ma k Drugu)* [*The Pillar and Ground of the Truth (Letters to a Friend)*], in *Voprosy religii* 2 (1908) 262-268.

[48] Cf. P. Florensky, *Stolp i utverzhdenie Istiny: Opyt pravoslavnoj teoditsei v dvenadtsati pis'makh*, Put', Moscow 1914, 506-514; P. Florensky, *The Pillar and Ground of the Truth: An Essay in Orthodox Theodicy in Twelve Letters*, Translated by B. Jakim, Princeton University Press, Princeton 1997, 359-364.

antinomy of finitude *versus* infinitude that is sublated in the concept of actual infinity. The Truth, the Triune God, is Absolute Actual Infinity. Florensky opposes the rationalistic ignorance to «the *givenness* of knowledge», which «has two steps: symbolic knowledge and knowledge that is immediate»[49]. It is mathematics that gives us «symbols of the infinite»[50] and teaches us to work with actual infinity through its symbols. Thus, mathematical symbolic knowledge of the infinite prepares our souls for the acceptance of divine revelation. Florensky appreciated mathematics as a unique ally in his battle against rationalism (and positivism) and for the Christian world view[51].

The way of introducing irrational numbers established in mathematics gives a paradigmatic example of symbolic knowledge of actual infinity in its relation to the finite. A potentially infinite series of rational numbers constitutes a so-called fundamental or Cauchy sequence if its elements become arbitrarily close to each other as the sequence progresses. A Cauchy sequence (or, to be more precise, a class of equivalent Cauchy sequences) can be considered, according to that approach, as an actual single object for which an individual symbol and rules of operation are introduced. Some of them can be identified with already familiar rational numbers, but the others define new numerical objects. These are irrational numbers as defined by Georg Cantor. Following step by step along the series of rational numbers, it is impossible to reach the irrational number in question; a radical leap of thought is needed to move immediately from running along the Cauchy sequence to the comprehension of it as a whole. In this sense, "rationally", i.e., from the point of view of ratios, an irrational number is something ungraspable, requiring a shift to a suprarational level.

Florensky also finds that irrational numbers not only help fight rationalism, as an example they are paradigmatic for theological thought that aspires to grasp the relationship between the world and its Creator.

> «Immanence and transcendence in the domain of the essences of reason are similar to those in the domain of the essences of ontology: God is transcendent for the world from the point of view of the world, but the world is not transcendent for God; rather, it is wholly permeated with Divine energies»[52].

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[49] P. Florensky, *The Pillar* (1997), 47; Id., *Stolp* (1914), 63; Id., *Stolp* (1908), 272.

[50] P. Florensky, *The Pillar* (1997), 354; Id., *Stolp* (1914), 499. This expression (*die Unendlichkeitssymbole*) goes back to Georg Cantor and Schelling. Cf. P. Florensky, *O simvolakh beskonechnosti* [*On the Symbols of the Infinite*] (1904), in P. Florensky, *Selected Works*, vol. 1, 79-128. Excerpts from this paper were included in the second version of *The Pillar* as a supplementary chapter xv. Cf. P. Florensky, *Svjatoj Vladimir: Poema* [*Saint Vladimir: A Poem*], in E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 253.

[51] Cf. V. Shaposhnikov, *A Sea of Glass*, 363-382.

[52] P. Florensky, *The Pillar* (1997), 363; Id., *Stolp* (1914), 512; Id., *Stolp* (1908), 266 ("metaphysics" instead of "ontology" in version 1).

Any sequence of rational numbers represents the real number (rational or irrational) only with accuracy within an equivalence class. Any real number is "incomprehensible" from the point of view of rational numbers; it is transcendent for them. On the contrary, any rational number can be interpreted on a par with irrational numbers as a class of equivalent Cauchy rational sequences that is something immanent to the realm of real numbers.

The example with irrational numbers is the most striking one, though, in *The Pillar*, there are also attempts to use mathematical logic and its notation to balance the conflicting claims of a rationalist and a mystic[53]. Florensky was rather proud of these attempts: «in this book, for the first time (at least in the Russian literature), the algorithm of symbolic logic is applied to philosophy»[54]. Moreover, he used the probability theory to fight "historical rationalism", which is a hypercritical approach to historical documents on rational grounds[55], and he also tried to revitalize Daniel Bernoulli's concept of "moral expectation" for this purpose[56].

The Pillar can be split de facto into two main parts: the first one (Letters 1 to 6) deals with the theory of knowledge, especially the antinomic nature of reason and its roots in God; the second one (Letters 7 to 12) deals with ontology, culminating in the doctrine of Sophia. It may seem that all mathematics is associated with the first part of the book only, but the presence of mathematical background, though rather tacit, can be traced in the second part as well.

4. From set theory to Sophia

The frontiers of mathematics of the time, especially paradoxical properties of infinite collections, studied in Cantor's set theory, together with extreme

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[53] See (1) some discussion on a problem of Lewis Carroll in Supplement xvi (cf. P. Florensky, *Stolp* [1914], 500-505; Id., *The Pillar* 1997, 355-358) associated with the Letter 3; (2) an analysis of the problem of identity in the Supplement xix (Cf. Id., *Stolp* [1914], 519-529; Id., *The Pillar* [1997], 368-374) associated with the Letter 4 and (3) a digression on "the formula of antinomy" in the Letter 6 (cf. Id., *Stolp* [1914], 148-153; Id., *The Pillar* [1997], 110-114). The first version of *The Pillar* (1908) lacks the three passages just mentioned. The main source of Florensky's meditations on mathematical logic and its apologetic potential was L. Couturat, *Les Principes des mathématiques, avec un appendice sur la philosophie des* mathématiques *de Kant*, Félix Alcan, Paris 1905, a French variation of Bertrand Russell's *The Principles of Mathematics* (1903).

[54] The inscription on a copy of *The Pillar* of 9 February 1914 to P.A. Alferov, see Hierodeacon Andronik (Trubachev), *On the Creative Career*, 515.

[55] See Supplement xxiii (cf. P. Florensky, *Stolp* [1914], 544-551; Id., *The Pillar* [1997], 384-389) associated with Letter 10. This supplement was elaborated from a shorter footnote in the first version of *The Pillar* where the main idea was already stated: Id., *Sofija: Iz pisem k Drugu (Okonchanie)* [*Sophia: From the Letters to a Friend (The final part)*], in *Bogoslovskij vestnik* 7-8 (1911), 588-589 (of the 4th pagination). Cf. also Id., *Zametka ob istoricheskom poznanii* [*A Note on Historical Knowledge*] (1911), in Id., *Selected Works*, vol. 3(2), 66.

[56] «Daniel Bernoulli's "moral expectation" has become classic, but no one ever makes use of it» (F. Cajori, *A History of Mathematics*, Macmillan and Co., New York 1894, 239).

widening of the idea of mapping in the theory of functions that was being built on set-theoretical base at the turn of the century, looked to be of great importance and significance for Florensky, and this is understandable enough if one keeps in mind his idea of mathematical apologetics. He was working hard on these mathematical issues through his university years, and a monument to his efforts is a voluminous, unfinished and still unpublished manuscript titled, not without pretension to philosophical implications, *The Idea of Discontinuity as an Element of a World-Contemplation* (*Ideja preryvnosti kak element mirosozertsanija*). The first part of this mathematical work, which covered only singularities of algebraic curves, finally served Florensky as his diploma project in 1904[57].

The concept of *set* as unity of plurality was viewed by Florensky as a formal mathematical presentation of the intuition of Vladimir Soloviev's "*all-unity*" (*vseedinstvo*). Consider the way in which Florensky commented in *The Pillar* on his own use of the concept of all-unity: «But we must qualify our use of Solovyov's definition in our work by saying that we take it only *formally*, emptying it of his interpretation»[58]. Here "formally" means «sub specie mathematica»[59].

One of his main inspirations through his university years and on was Nikolai Bugaev's "arithmology"[60]. Florensky's memoir *For My Children* describes his childhood as a *discreet* variety and mutually distinct diversity of natural forms, externally disintegrated and internally unified at the same time. That is why, possibly, while in the university, having come across Bugaev's arithmology, which insisted on discontinuity being a more fundamental feature of phenomena than continuity, he appreciated it as a true explication of his own

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[57] On mathematical works of Pavel Florensky in 1900-1904 see V. Shaposhnikov, *Matematika kak kljuch k mirovozzreniju* [*Mathematics as the Key to the Weltanschauung*], in P.V. Florensky (ed.), *Entering the Way*, vol. 1, 383-412.

[58] P. Florensky, *The Pillar* (1997), 433; Id., *Stolp* (1914), 612.

[59] P. Florensky, *Notebook 1904-1905*, in E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 340.

[60] Cf. S.S. Demidov, *On an Early History of the Moscow School of Theory of Functions*, in *Philosophia Mathematica* (Second series) 3 (1988) 29-35; S.M. Polovinkin, *Moskovskaja filosofsko-matematicheskaja shkola* [*Moscow Philosophico-Mathematical School*] (1991), in Id., *Russkaja religioznaja filosofija: Izbrannye stat'i* [*Russian Religious Philosophy: Selected Papers*], Russkaja khristianskaja gumanitarnaja akademija, Saint Petersburg 2010[2], 280-300; V. Shaposhnikov, *Filosofskie vzgljady N.V. Bugaeva i russkaja kul'tura XIX – nachala XX vekov* [*Nikolai Bugaev's Philosophical Views and the Russian Culture of the Late 19th and early 20th Centuries*], in *Istoriko-matematicheskie issledovanija* 7(42) (2002), 62-91; M.A. Prasolov, *"Tsifra poluchaet osobuju silu": Sotsial'naja utopija Moskovskoj filosofsko-matematicheskoj shkoly* [*"Digit gains especial power": The Social Utopia of the Moscow Philosophico-Mathematical School*], in *Zhurnal sotsiologii i sotsial'noj antropologii* [*Journal of Sociology and Social Anthropology*] 10 (2007) 38-48; T. Langen, *Nikolai Vasilievich Bugaev: A Background*, in *Russian History* 38 (2011) 175-198; I. Svetlikova, *The Moscow Pythagoreans: Mathematics, Mysticism, and Anti-Semitism in Russian Symbolism*, Palgrave Macmillan, New York 2013, especially Ch. 1.

underlying intuitions[61]. A little later, having gotten acquainted with Cantor's set theory, he once again recognized his intimate intuitions as being mathematically realized: any manifold even continuum was built up as the complex unification of discreet elements. In his memoir he wrote on discontinuity:

> «In mathematics especially intimate, almost physically close, I feel Fourier series and other expansions, which present any complex rhythm as a collection of simple ones. I feel alike toward continuous functions differentiable nowhere and everywhere discontinuous functions, in which everything comes apart and all elements are put upright»[62].

This intuition of a multiplicity of discreet forms is in no way inconsistent with the intuition of all-unity: the way to the true unity goes through true isolation. The all-unity is neither a mere unity nor its opposite – a mere plurality – but rather a synthesis of both in a perfect whole, a unity-of-plurality.

The fundamental ideas of contemporary mathematics, the ideas of *set* and *function*, were for Florensky the very base of cognition that was to determine the unparalleled philosophical significance of mathematics. He wrote on the subject in *On the Types of Growth* (1905, published 1906):

> «The basic mathematical idea, the idea of *set*[63], can be applied to everything in which consciousness synthesizes plurality into unity; already by this *very* synthesis, as the central function of consciousness, mathematics, as the science of sets, is being made applicable wherever consciousness works far and wide»[64].

In the *Translator's Preface* (1905) to Kant's *Physical Monadology*, he continued to discuss the theme in such a way:

> «The idea of *set* as the synthesis of plurality and unity is the central category of cognition, if being is cognized from the standpoint of form. Hence, the importance of "*set theory*" (Mengenlehre, théorie des ensembles) for philosophy is made clear.

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[61] Cf. P. Florensky's letter of 25 October 1900 to his father, in P.V. Florensky (ed.), *Entering the Way*, vol. 1, 198.

[62] P. Florensky, *Detjam moim* [*For My Children*], Moskovskij rabochij, Moscow 1992, 51.

[63] Florensky actually said "the idea of *group* (ideja *gruppy*)" instead of "the idea of *set* (ideja *mnozhestva*)" and "group theory (teorija grupp)" instead of "set theory (teorija mnozhestv)". The Russian word "*mnozhestvo*" means "plurality (as opposed to unity)" while Florensky was looking for a word to express unity-of-plurality. Now both in English and Russian mathematical language "group theory (teorija grupp)" is occupied for the name of entirely different mathematical theory, and the term "set theory (teorija mnozhestv)" is generally accepted.

[64] P. Florensky, *O tipakh vozrastanija* [*On the Types of Growth*] (1906), in Id., *Selected Works*, vol. 1, 284.

> This theory, being the formal study of the idea of set, creates consequently a number of propositions and schemata the purity of which is not sullied by prejudices and predispositions. That is why wherever one tries to talk about discontinuity and continuity, infinity and finiteness, a limit and tend-to-the-limit elements, etc., the application of ready-to-use schemata and strictly proved theorems of set doctrine is really necessary so as to avoid confusion over questions of the sort which one meets at every step in philosophical works. […] [E]veryone beginning to build up his world view, the one who wishes to produce rational schemata, must bear in mind the idea of set, and it may be asserted that only when a philosopher becomes distinctly conscious of this idea, a philosophical work proper is started»[65].

Now, I will continue to quote from *On the Types of Growth*:

> «The next basic mathematical idea, the idea of *function* or functional dependence of sets, is applicable each time consciousness synthesizes two or more sets together while preserving their individual unity; that is, each time the activity of consciousness brings these sets together, on the one hand, preserving the distribution of the elements within initial unities and, on the other hand, forming a new set of the higher degree, not of the initial elements but of any sort of correspondences between the elements of different sets or, in other words, interpreting subsets formed of the elements of the initial sets as elements of a newly synthesized set[66]. To fix some sort of correspondence between the elements of some sets, we think (from the formal point of view) of nothing more when speaking of a law or a regulation [of phenomena]. And as any thinking activity starts at fixation of *generalia* in phenomena, i.e., at reducing [phenomena] to some sort of a law, even if very primitive one, it allows us to point out the second basic mathematical idea to be applicable whenever reflection starts»[67].

Florensky was entirely convinced that mathematics provided philosophy and theology with «not analogies or comparisons but indications of essential similarities, not something that can be accepted or rejected according to one's tastes, but something justified by distinct premises – in short, mentally-indispensable schemata»[68].

Florensky's special interest in sophiology can be explained (at least in part) as his attempt to bridge the gap between pure mathematics and "raw

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[65] P. Florensky, *Ot perevodchika (Vstupitel'naja stat'ja k perevodu: I. Kant. Fizicheskaja monadologija)* [*Translator's Preface (Introduction to a Translation of I. Kant's Physical Monadology)*] (1905), in Id., *Selected Works*, vol. 1, 682.

[66] To put it more correctly, it is pairs (or, perhaps, triples or *n*-tuples), formed from the elements of initial sets according to certain rules depending on the type of correspondence, that serve as the elements of a new set. This new set is a Cartesian product of initial sets.

[67] P. Florensky, *On the Types of Growth*, in Id., *Selected Works*, vol. 1, 284-285.

[68] *Ivi*, 284.

material"[69] of religious experience. The connection between set theory and sophiology is quite obvious in his *Notebook 1904-1905*, which contains early drafts toward *The Pillar*[70]. Initially, he planned to make his diploma project at the Moscow Theological Academy on "Sophia, Wisdom of God", and to divide it into two parts: «v. I: Metaphysical-dogmatic-historical-iconographic-psychological study; v. II: Sophia in the world; mathematical-scientific study in natural philosophy»[71]. According to this concise plan, Florensky pretended to marry the (already mentioned) distinct poles through the mythology of Sophia.

Sofia is a concretization of all-unity; it is no mere coincidence that the vignette for Letter 10 *Sophia* bears a legend «*Omnia conjungo*, I unite all»[72]. In his *Notebook 1904-1905*, Florensky uses the name of Sophia for «the plurality that is eternally bound by the Unity», that is by Logos as order and harmony (*stroj*), «the plurality in its ideal substance (*mnozhestvennost' v ee ideal'nom soderzhanii*)»[73]. In *The Pillar*, Sophia-Wisdom is nearly synonymous to the Kingdom of God and to the Heavenly Jerusalem[74]. In the *Notebook*, a connection between the Kingdom of God and the formal aspect of all-unity and, therefore, set theory is easy to trace: «[T]he Kingdom of God requires, as its precondition, diversity of its subjects; however, there should be not mere plurality but a unifiable plurality, actually unified "later on"; there should be the Whole (*Tseloe*)»[75]. As far as the Heavenly Jerusalem is concerned, it is associated in *The Pillar* with the Great City in which individual mansions (John 14:2) are «like the cells of a honeycomb»[76]. These individual mansions are also «types of spiritual growth»[77] discussed in more detail in Florensky's *On the Types of Growth*[78] with the paradigmatic help of the mathematical theory

[69] Florensky's letter of 10 February 1906 to his parents, see P. Florensky, *Perepiska 1906 goda* [*Correspondence of the year 1906*], in *Novyj zhurnal* 243 (2006) 131. Unfortunately, in this publication, the phrase in question was misread as "old material (*staryj material*)", while the manuscript actually says "raw material (*syroj material*)".

[70] Cf. N. Pavluchenkov, *Matematika v religiozno-filosofskom nasledii svjashchennika Pavla Florenskogo* [*Mathematics in Priest Pavel Florensky's Religious-Philosophical Heritage*], in *Entelekhija* 26 (2012) 35.

[71] E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 337.

[72] P. Florensky, *The Pillar* (1997), 231; Id., *Stolp* (1914), 319. Cf. E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 325.

[73] E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 343-344.

[74] Cf. P. Florensky, *The Pillar* (1997), 241; Id., *Stolp* (1914), 332.

[75] E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 341.

[76] P. Florensky, *The Pillar* (1997), 240; Id., *Stolp* (1914), 330.

[77] *Ibidem*.

[78] Two more papers were planned along that line of thought: *On Growth of the Types* and *On Love of Evil*. See E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 357, 338, 332-333, 354-355.

of functions, namely Paul du Bois-Reymond's scale of infinities[79]. Let me add here one more passage from *The Pillar*: «Like a crystal, a Christian community is not fragmented into amorphous, noncrystallized homoeomeric parts»[80]. Both metaphors, those of a honeycomb and of a crystal, bear implicit reference to the order mathematical in its nature.

5. Formula of form: Florensky's Pythagoreanism tinged with Goetheanism

> «Numbers in general turn out to be underivable from anything else, and all attempts at such a deduction fail completely, and, at best, when they do appear to lead to something, they suffer from *petitio principii*. A number is derivable only from a number, not otherwise. And as the most profound characteristic of essences is connected precisely with numbers, one comes inevitably to the Pythagorean-Platonic conclusion that numbers are the fundamental, transempirical roots of things, things in themselves *sui generis*. In this sense, one again inevitably comes to the conclusion that things, in a certain sense, are phenomena of absolute, transcendent numbers»[81].

In the passage just quoted from *Remarks on Trinity* (Supplement xxix) in *The Pillar*, we have one of the clearest manifestations of Florensky's Pythagoreanism.

The mathematical concept of *set* was viewed by Florensky as being closely related to one of his central philosophical concepts: the concept of *form (forma)*, which was understood along the lines of Platonic tradition, though a considerable portion of Goethe's morphology had been grafted onto it[82]. Florensky's forms were first and foremost *embodied* forms aimed at Goethe's "types (*Typen*)" and "proto-phenomena (*die Urphänomene*)" as their ideal: «what I was striving for was Goethe's proto-phenomenon but, probably, even more ontologically strong, according to Plato»[83]. It is widely known that Goethe detested mathematics, but new "arithmological" and set-theoretic mathematics of the twentieth century is, perhaps, far better compatible with his morphology, or, at least, Florensky hoped it to be.

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[79] Florensky refers to Du Bois-Reymond's Theorem. See P. Florensky, *Selected Works*, vol. 1, 291; G. Fisher, *The Infinite and Infinitesimal Quantities of du Bois-Reymond and their Reception*, in *Archive for History of Exact Sciences* 24 (1981) 106.

[80] P. Florensky, *The Pillar* (1997), 301; Id., *Stolp* (1914), 419.

[81] P. Florensky, *The Pillar* (1997), 421; Id., *Stolp* (1914), 595.

[82] Cf. H. Henel, *Type and Proto-Phenomenon in Goethe's Science*, in *PMLA* 71 (1956), 651-668; P. Florensky, *Smysl idealizma* [*The Meaning of Idealism*] (1915), in Id., *Selected Works*, vol. 3(2), 68-144; Id., *For My Children*, 158-159; A letter of 21 February 1937 to his son Kirill, in Id., *Selected Works*, vol. 4, 672-673.

[83] P. Florensky, *For My Children*, 159.

The individuality of embodied forms and arithmological discontinuity are inseparable, and only being accepted together can they lead one to the true comprehension of a living integrity's unity. Their interconnection is a special item in *Pythagoras' Numbers*, Florensky's introduction to his intended book, *Number as a Form* (1922):

> «[…] if some phenomenon is changing continuously, that means it lacks an intrinsic measure, its schemata as a whole, which limits its change in virtue of correlation and interconnection between its parts and elements. In other words, *continuity of changes has lack of form as a premise*: a phenomenon of the kind is not marked out from the environment for it is not constricted intrinsically into a single entity, which is why it can spread about in the environment indefinitely, without measure, and take all possible transitional values»[84].

The concept of *number* was apprehended by Florensky through his central concept of *form*. Number is not a mere collection of units; it has integrity and individual form at its core. «Number is a sort of prototype, an ideal schema, a primary category of thought and being. It is a sort of elementary intellectual organism, which qualitatively differs from other organisms of the type: [other] numbers»[85]. He found such a theory of number at the very origins of European culture – in the ancient Pythagoreans, Platonists and Neoplatonists. The apparent return to the comprehension of number as a form became obvious at the turn of the century, according to Florensky. He foresaw a breakthrough toward such an understanding of number in Cantor's "order-types (ideal numbers)", which, like natural numbers, are thought of as abstractions from the nature of elements of a set. *Order-type* is «a single organic whole, which consists of different units preserving certain mutual order (in one or more dimensions)»[86]. Here, some *matter* (abstract units) is brought under some *form* (a certain type of order). "Number as a form" means intrinsically structured number; it means *number as a structure*. «If the theory of *n*-dimensional order-types is elaborated sufficiently, extremely complicated structures of natural objects will be represented by a single number, and a potent tool for the cognition of reality (as the realm of forms) will be forged»[87]. «Science is quite unwittingly returning to the Pythagorean idea that *everything is representable by a whole number*, and therefore, an intrinsic number is essentially characteristic of everything»[88].

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[84] P. Florensky, *Selected Works*, vol. 2, 633.
[85] *Ivi*, 637-638.
[86] *Ivi*, 638.
[87] *Ivi*, 639.
[88] *Ivi*, 635.

The idea to represent any single phenomenon by a mathematically single entity (number, function or formula) was highly relevant to Florensky. He wrote in 1922: «There is nothing in nature principally unrepresentable by symbols of mathematics, no matter how subtle, complex, capricious and elusive it is. Any phenomenon has its *formula*; any phenomenon corresponds with its *function*»[89]. But, the function in question cannot be continuous in all cases: there is nothing impossible in expressing integral phenomenon with a single formula when using discontinuous functions and arithmological formulae. Florensky's idea presupposes an intimate connection between mathematical formulae and Platonic forms. In the announcement of his forthcoming book, *At the Watersheds of Thought*, placed on the last pages of his *The Imaginaries in Geometry* (1922), the section titled *Formula of form* (*Formula formy*) was planned for the third issue of the book[90], however, to remain unwritten.

In the self-synopsis, he summed these ideas up:

> «[…] for F[lorensky], the most essential thing in the knowledge of the world is universal regularity as a functional connection but taken in the sense of the theory of functions and arithmology. Discontinuity in respect of connections and discreetness in respect of reality itself prevail in the world. What is inadmissible for positivism and Kantianism as transgressing continuity nevertheless is law-governed and corresponding to functions being discontinuous, multivalued, plane-filling, without derivative, etc. On the other hand, the discreetness of reality leads to the affirmation of form (in Plato-Aristotelian sense of the word) as a single whole, which is "before its parts" and determines these parts rather than is built up of them. Hence, [there is] his interest toward integral equations and functions of lines and surfaces[91], etc.; hence, [there is], in another direction, his Pythagorean trend and the tendency to comprehend number as a form»[92].

6. Concrete Mathematics: Fighting abstractions and rationalism within mathematics

In his later years, Pavel Florensky tended not so much to conclude from the already existing edifice of pure mathematics to the structure of a holistic worldview-to-be, but got rather critical toward the mathematics of his time and the usual ways of teaching it as failing to meet his high and peculiar standards, secretly craving to rediscover or create some new mathematics, one that

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[89] P. Florensky, *Printsip preryvnosti* [*The Principle of Discontinuity*] (1922), a manuscript.

[90] P. Florensky, *Mnimosti v geometrii* [*The Imaginaries in Geometry*], *Pomor'e*, Moscow 1922, 68.

[91] Nowadays the standard term for this kind of function is "a functional".

[92] P. Florensky, *Selected Works*, vol. 1, 40-41.

Goethe could have accepted and approved of. Florensky's self-synopsis runs as follows on the subject:

> «Mathematics is seen by F[lorensky] as the necessary and prime prerequisite for a world view, but its self-sufficiency is considered by him to be the cause of its cultural fruitlessness: mathematics should receive a guiding impetus from a general world-understanding, on the one hand, and from technology and empirical exploration of the world, on the other»[93].

Florensky spoke more and more of the reciprocal effects of mathematics and the holistic world view (including sciences, technology, and everyday experience). In his 1919 *Lecture Notes on Teaching Strategies in Geometry* for his course at the Sergiev Institute of Popular Education, Florensky claimed:

> «*Life-oriented* organization of teaching geometry (and mathematics in general) means this very linkage between mathematics and life, as both basis and field of application. Figuratively, mathematics can be imagined as a junction node where numerous lines, representing other areas of knowledge and life experience in general, both meet and start from»[94].

«My goal is to imbue philosophical concepts with life and concreteness», Florensky said in his lecture notes of 1921[95]. His famous project of "concrete metaphysics" was paralleled by the far less known one of "concrete mathematics", though he never (as far as I know) used this exact expression. Actually, he had pursued this quest for concrete mathematics since his university years. For instance, Florensky's famous *The Imaginaries in Geometry* (1922) was initially a 1902 manuscript aimed at visualization, and hence "concretization", of some degenerate cases in analytic geometry[96].

Around 1915, Florensky became especially interested in the Kabbalistic way of thinking as a paradigmatic example of concreteness[97]. He was appar-

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[93] *Ivi*, 41.

[94] P. Florensky, *Zametki k lektsijam po metodike geometrii* [*Lecture Notes on Teaching Strategies in Geometry*] (1919), a manuscript, 17.

[95] Translation by Boris Jakim, see: P. Florensky, *At the Crossroads of Science & Mysticism: On the Cultural-Historical Place and Premises of the Christian World-Understanding*, Tr. and ed. by B. Jakim, Semantron Press, Middletown 2014, 16. Cf. P. Florensky, *Selected Works*, vol. 3(2), 392.

[96] Cf. V. Shaposhnikov, *Mathematics as the Key to the Weltanschauung*, 402, 405.

[97] Florensky sporadically mentioned the Kabbalah since his first paper in philosophy published in 1904. See K. Burmistrov, *The Interpretation of Kabbalah in Early 20th-century Russian Philosophy: Soloviev, Bulgakov, Florenskii, Losev*, in *East European Jewish Affairs* 37 (2007) 157-187. Konstantin Burmistrov is rather critical of the quality of Florensky's knowledge of the Kabbalah, which was taken mainly from secondary occult sources.

ently impressed with the Sephirot as a system of concrete categories and the so-called "gematria", i.e., a characteristic interplay between language elements (letters, sounds) and natural numbers; hence, between names and natural numbers. In his self-synopsis, he once again refers to the Kabbalah, speaking of categories that are «not abstract, but concrete»[98]. His own version of a category system as late as his book *Names* (around 1926) clearly contains a parallelism of names and numbers as its pivot[99]. His Platonism unpacks itself as a Kabbalah-inspired complementarity of Name Worshipping (*imeslavie* or *imjaslavie*) and Pythagoreanism.

Florensky owes some insights on mathematics to the Kabbalah as well. In a letter dated 26 November 1915 to Nikolai Luzin, he expressed it rather emotionally:

> «It is amazing how many intellectual trends have originated from the Kabbalah, and besides, have lost the main inspiration of the Kabbalah and have gotten mechanical and extremely boring. For example, that logistic[100] of yours, for sure, is nothing else but a derivative of the Kabbalah. But, dear Lord! How exciting, full of inspiration and powerful all that stuff is in the Kabbalah, and how boring and dull it is in Peano, Russell[101] and others! Now, Hegelian dialectics is also no more than a castrated Kabbalah»[102].

In the light of Florensky's historiosophical conception of a new Middle Ages[103], to develop truly new mathematics in the early twentieth century means, at the same time, to get back to a true medieval understanding of the nature of mathematics, exemplified by the Kabbalistic "mystical arithmetic".

The last words in quotes are taken from Florensky's short 1916 introduction to his earlier mathematical manuscript *On the elements of the base-α*

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[98] P. Florensky, *Selected Works*, vol. 1, 39.

[99] See *Names (Imena)*, section xvii: P. Florensky, *Selected Works*, vol. 3(2), 221-223; V. Shaposhnikov, *Number as a Category*, 341-367. Burmistrov draws a parallel between Florensky's system in *Names* and that of *Sefer Yezirah* (K. Burmistrov, *The Interpretation of Kabbalah*, 168-169).

[100] Florensky used the Russian word *logistika*. Here it is a now archaic word for "symbolic or mathematical logic", probably, from French "logistique".

[101] Giuseppe Peano and Bertrand Russell were key figures in the contemporary development of mathematical logic. Florensky's idea to connect mathematical logic with the Kabbalah is not that unfeasible as it may seem at the first glance. Modern development of mathematical logic owes much to Leibniz, and the latter was deeply influenced by the Kabbalah. Cf. A.P. Coudert, *Leibniz and the Kabbalah*, Springer, Dordrecht 1995.

[102] *Perepiska N.N. Luzina s P.A. Florenskim* [*Correspondence of N.N. Luzin and P.A. Florensky*], in *Istoriko-matematicheskie issledovanija* 31 (1989) 181. For another English translation of a part of this passage, cf. C.E. Ford, *N.N. Luzin as Seen Through His Correspondence with P.A. Florensky*, in *Modern Logic* 3/4 (1997) 240.

[103] Cf. P. Florensky, *At the Crossroads*, 2.

numeral system (1906) published under the title *Reduction of Numbers*[104]. In this introduction, he interpreted his work as the quest for mathematical grounds underlying a Kabbalistic practice of reduction of multidigit numbers by adding up their digits until they are reduced to a single digit. The permissibility of such a practice, which he sought to justify, he considered being "a ubiquitous human belief". By all means, Florensky treasured this work of his because he planned to republish it once again in the year of 1923 as a chapter of his book *Number as a Form*.

The *Reduction of Numbers* introduced a method for "concretization" of a natural number by changing the base of its numerical representation and visualizing it as a regular polygon (convex or star) inscribed in a circle[105]. A pet name for this method was "a microscope for numbers (*mikroskop dlja chisel*)"[106]:

> «According to this method, a number is represented not only as a point but also as a polygon. Such representation of a number as a polygon makes it possible to know its intrinsic nature; it puts the number, so to say, under a microscope. A point (a bud) unfolds its potencies when turning into a polygon (a flower); and all that in a point was open to intellectual contemplation only, now becomes intuitively obvious; all that was the subject of rational conviction, as far as its reality is concerned, becomes experimentally verifiable»[107].

In this work, Florensky also mentions the parallel between a collection of further irreducible numerical "roots (*korni*)", discovered by reduction, and basic phonetic elements (a Kabbalistic leading motif)[108].

Florensky was also interested in another medieval predecessor of symbolic logic (the connection of which with Kabbalah is still a moot point): Lullism[109]. In *Notebook 1904-1905*, on the list of works to be written as soon as possible, one of the points is «The Rehabilitation of Raymond Lully's *Ars Magna*»[110]. With *Ars Magna*, Florensky associated some of ideas on which he dwelt at length during his student days both at the university and the academy: an elaboration of Georg Cantor's classification of philosophical systems

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[104] Cf. P. Florensky, *Privedenie chisel* [*Reduction of Numbers*], in *Bogoslovskij vestnik* 2 (1916) 292-321 (of the 2nd pagination).

[105] See V. Shaposhnikov, *Number as a Category*, 360-361.

[106] This expression is taken from one of Florensky's preparatory notes dated 26 December 1910.

[107] P. Florensky, *Reduction of Numbers*, 312.

[108] Cf. *ivi*, 320-321.

[109] Cf. T. Koetsier, *The Art of Ramon Llull (1232-1315): From Theology to Mathematics*, in *Studies in Logic, Grammar and Rhetoric* 44 (2016) 55-80; A. Bonner, *The Art and Logic of Ramon Llull: A User's Guide*, Brill, Leiden 2007.

[110] E.V. Ivanova (ed.), *Pavel Florensky and the Symbolists*, 335.

according to their attitude toward actual infinity[111]; the topological theory of networks[112] (and hence, "a microscope for numbers" as closely connected with it) and a general theory of symbolism.

It is worth noting that in *The Pillar*, Florensky was already rather critical toward modern mathematical logic because it seemed too abstract to be able to grasp concrete individuality: «here, we see most clearly the impotence of logical thought in the face of concrete, i.e., individual, being; and the pitifulness (a necessary pitifulness!) of rationality's attempt to replace individual being with rational-like – but not rational – terms»[113]. In "Notes and brief comments" to *The Pillar*, we find one more noteworthy comment on the subject:

> «To prove is to generate dialectically what is being proved (Cf. Hermann Cohen, *Logik der reinen Erkenntniss*, Berlin, 1902). Rationalism is precisely the expression of this tendency – be it the rationalism of Fichte, Schelling, Hegel, of the contemporary Marburg philosophers or, finally, of the logistic philosophers (*logistiki*)[114]. In essence, all of these thinkers are occupied with the same task – that of expelling from the domain of thought all that is not constructed purely logically, i.e., that of rationalizing all of thought. However, it is in the domain of the foundations of mathematics that this "logicization" of science is being executed most consistently and rigorously through the intermediary link of "arithmetization". However, among all of these thinkers, and among the mathematicians as well, one cannot fail to see that intuition, chased out the door, inevitably flies back through the window. But as a courageous attempt, as an experiment at clearly reducing to the absurd the very principle of the rationalistic, all these currents are highly interesting and instructive»[115].

Logicism is severely criticized here as a form of rationalism. Words in favour of "intuition", as opposed to "pure logic", mean the defense of the concrete in opposition to the abstract in mathematics.

In his 1932 paper *Physics in the Service of Mathematics*, Florensky argued at length that mathematical investigation is always deeply rooted in experience. That is why all attempts to purify mathematics of intuitions and reduce it to pure logic are self-defeating.

> «On close examination, such attempts always turn out to abound in intuitions (with but one difference: these intuitions are pallid and vague) that are introduced

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[111] Cf. V. Shaposhnikov, *A Sea of Glass*, 374-377.

[112] Cf. V. Shaposhnikov, *Mathematics as the Key to the Weltanschauung*, 406-411.

[113] P. Florensky, *The Pillar* 1997, 373; P. Florensky, *Stolp* 1914, 526.

[114] Mathematical logicians and representatives of the so-called *logicism* (such as Bertrand Russell and Louis Couturat) are apparently meant here.

[115] P. Florensky, *The Pillar* (1997), 443; Id., *Stolp* (1914), 625-626.

> stealthily under the mask of pure logic. Even if mathematics were really reducible to pure logic, it would not decide a big issue how logic itself is to be understood and what underlie its laws»[116].

Plutarch tells the story of Plato, who reproached mathematicians for using mechanical devices in geometry (*Questiones Convivales* 8.2.1). Florensky, on the contrary, welcomes the introduction of natural science and technology into mathematics. Mathematics should rely on "all the fullness of life".

> «The more conscious and wide is the life basis of mathematics, the more luxurious will be the blossoming of its creativity. Mathematics served and serves science and technology; but, let the latter two serve mathematics back. Let various physical factors underlie the development of mathematical [automation] devices (*matematicheskie pribory*)[117]; let mathematics take from engineering, from physics, from science, in an open and free gesture, what it has the right to take and what it was always taking from there but by stealth. Physical models, physical and perhaps chemical devices, biological and psychological aids should be introduced into mathematics»[118].

Florensky was sure of a radical transformation of mathematical thought «when the conditional and scholastic character of the modern mathematical formalism is clearly recognized and the idea that mathematics proceeds from life, is fed on it and serves it is fully assimilated»[119]. It meant for him, on top of everything else, almost complete identification of mathematical and engineering thought. There was no strong opposition between the artificial and natural for Florensky because he considered the study of technology and biology as mutually supportive[120].

> «To invent a mathematical machine, one needs a clear mathematical reasoning, but [to be able] to invent mathematical formula means to be skilled in construction. A formula is a realization of abstract notions in some concrete material: in words, letters or signs; it is a construction that inevitably involves an engineering

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[116] P. Florensky, *Fizika na sluzhbe matematiki* [*Physics in the Service of Mathematics*], in *Sotsialisticheskaja rekonstruktsija i nauka* 4 (1932) 43.

[117] The main part of Florensky's 1932 paper deals with "mathematical machines", i.e., analog devices using physical or chemical principles to solve mathematical problems. He discusses in detail some machines of his own construction (invented in 1922), two equation solvers and one integrator. Cf. F.J. Murray, *Mathematical Machines*, Vol. II: *Analog Devices*, Columbia University Press, New York 1961.

[118] P. Florensky, *Physics in the Service of Mathematics*, 46.

[119] *Ibidem*.

[120] See P. Florensky, *Notes to the History of Philosophical Terminology course* (1917), in Id., *Selected Works*, vol. 3(1), 421. Cf. A. Pyman, *Pavel Florensky*, 119.

> activity. In their turn, engineering structures necessarily imply some mathematical thought»[121].

Florensky obviously tried to overcome the opposition of pure and applied mathematics in his project of concrete mathematics. He dreamed of mathematical forms growing naturally from the individual realities of our everyday experience and never becoming abstract, i.e., detached from the organic unity of the whole, but staying concrete if not alive. Florensky crowns his general discussion in the opening pages of his work with rhetorical questioning:

> «Do not vessels and growth rings of tree trunks, presenting a system of field and isopotential lines and surfaces, appeal to our intellect? Do not numerous animal and vegetable organisms, exemplifying forms of equilibrium and imprinting in their structure diverse types of order or, in certain cases, being projection-like in themselves, appeal to it?»[122].

In the same year, 1932, Florensky prepared for print a paper titled *Measurement of Form* with a subtitle *On the Issue of Standardization of Sand Fractions*. It deals mainly with special practical problems of soil physics but, at the same time, has as its ultimate object «to give general guidelines for the quantitative evaluation of form, i.e., to trace a course for *morphometry* (*morfometrija*), a new geometrical discipline that studies the measurement of form»[123]. The idea to develop such a mathematical discipline that would meet the real demands of material science was dear to Florensky. So, it is no accident that he was anxious to find out whether his paper had been printed or not (it was not, apparently because of his arrest)[124]. Moreover, he reverted to his work on morphometry in 1936-1937 while in Solovki[125].

Florensky's final areas of scientific and engineering activity in Soviet concentration camps, that is, studies of ice formations in the permafrost zone during his Far East period and of seaweed during the Solovki period, may be interpreted as an investigation into the secret life of concrete and embodied mathematical forms. While in the Far East, he was enchanted by the richness and beauty of ice formations that he hoped to classify exhaustively while he worked on the mathematical modeling of mechanical and electrical properties

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[121] P. Florensky, *Physics in the Service of Mathematics*, 46.

[122] *Ivi*, 46-47.

[123] P. Florensky - Y. Khan, *Izmerenie formy: K voprosu o standartizatsii peska* [*Measurement of Form: On the Issue of Standardization of Sand Fractions*] (1932), a typescript, 1.

[124] Cf. P. Florensky, *Selected Works*, vol. 4, 40, 58, 297.

[125] Cf. *ivi*, 413, 448-450, 481, 498, 548-551, 694, 702, 708-710, 713-714.

of ice and frozen soils, which he considered important for a general world-understanding[126]. In Solovki, he had to shift his attention from permafrost to the algae industry aimed primarily at the manufacture of iodine and agar. Florensky was especially attracted by the "fine structure" of seaweed and other non-vascular ("lower") plants. In this context, he confessed: «I have dreamed of developing the physics of systems with special structures. I failed in this respect»[127].

7. Conclusion

The project to obtain Truth through the building of a holistic world view turned out to be a life-long work for Pavel Florensky. His continuing commitment to it can be traced from his letter of 5 October 1900 (addressed to his mother) to his famous letter of 21 February 1937 (addressed to his son Kirill). Though the project was doomed to remain an unfinished work in progress, it seems to be a hidden motivating power behind the whole range of Florensky's diverse activities throughout his life. This paper is no more than the first attempt to demonstrate the crucial role of mathematics within this project.

Let us compare Pavel Florensky's *A Speech Outline* (1902) and *Physics in the Service of Mathematics* (1932). In the first text, the word "mathematics" refers to some eternal superhuman reality. Florensky began with his own translation of C.G. Jacobi's poem *Archimedes und der Jüngling* where mathematics is called "the divine art (die göttliche Kunst)" and the last two lines read «Was Du im Kosmos erblickst ist nur der göttlichen Abglanz, / In der Olympier Schaar thronet die ewige Zahl (What you see in the cosmos is only a reflection of the divine / In the Olympian host, the eternal number sits enthroned)»[128]. Florensky commented with sympathy: «The number reigns over the whole cosmos and even over God». Then, he interpreted Jacobi's "number" as «the most general laws, the prototypes of all sorts of relations between entities, that mathematics studies»[129]. In the second text, Florensky was especially concerned

[126] Cf. *ivi*, 47, 52, 59-60, 62, 64-65, 73, 75-77, 85-88, 99-101, 106-109, 123-125, 130-133.

[127] *Ivi*, 217. See Florensky's fascinating watercolours of seaweeds (1936-1937) in P. Florensky, *Vse dumy - o vas: Pis'ma sem'e iz lagerej i tjurem 1933-1937 gg.* [*All My Thoughts are about You: Letters from Camps and Prisons 1933-1937*], Satis, Saint-Petersburg 2004, a colour inset between pages 384 and 385. «Colour strengthens the comprehension of form greatly» (Florensky's letter of 15 July 1935 to his son Vasily, in P. Florensky, *Selected Works*, vol. 4, 263).

[128] W.B. Ewald, *From Kant to Hilbert: A Source Book in the Foundations of Mathematics*, Oxford University Press, New York 1996, vol. 2, 948.

[129] P. Florensky, *A Draft of the Speech*, 470.

about laying stress on mathematics as *human* activity. He protested ascribing to a mathematician "an abstract-metaphysical attribute of omniscience" and criticized "naivety and falsity of this pseudo-absoluteness". He insisted that mathematical cognition was in no way a sort of telepathy, but that it had an empirical character[130].

Do we have a contradiction here? I do not think it is the case. Florensky had no theoretical or practical problems with marrying successfully such classical oppositions as idealism and materialism, Platonism and empiricism, or divine and human mathematics. His symbolism, Goetheanism and passion for dialectics and antinomism helped him. His idealism turns out to be "concrete idealism", his materialism to be "sacral materialism", but concrete idealism and sacral materialism are almost identical for Florensky[131]. His Platonism is a theory of necessarily *embodied* forms[132], while his empiricism can be justly called "mystical empiricism" (to use Nikolai Lossky's term)[133]. In the case of divine and human mathematics, we also have a complementarity rather than a straightforward contradiction, the complementarity that is closely related to Florensky's famous opposition of *theodicy* and *anthropodicy*.

This opposition was initially introduced in his 1906 student philosophy circle speech, *Dogmatism and Dogmatics*[134], and then elaborated in his 1914 magister speech, *Reason and Dialectics*[135]. Florensky defined "theodicy" as a justification of God in the face of man, as ὁδὸς ἄνω, a theoretical ascent of man to God; it was associated with dogmas, *theosis* and the Trinity doctrine. On the contrary, anthropodicy was a justification of man in the face of God, ὁδὸς κάτω, a practical descent of God to man; it was associated with sacraments and mysteries, *kenosis*, the doctrine of hypostatic unity and Christology in general. «Certainly, neither theodicy nor anthropodicy can be isolated from the other. Any move within the sphere of religion antinomically combines the way up with the way down. […] As magnet poles are inseparable, so are the ways of religion»[136]. Their separation is no more than a *methodological* trick; their order is just a *methodological* order: first, consider theodicy, and only then pass to anthropodicy.

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[130] Cf. P. Florensky, *Physics in the Service of Mathematics*, 45-46.

[131] Cf. P. Florensky, *Filosofija kul'ta* [*The Philosophy of Cult*], Mysl', Moscow 2004, 64, 77.

[132] Cf. P. Florensky, *For My Children*, 153-159.

[133] Cf. P. Florensky, *Empireja i Empirija* [*On the Empirical and the Empyrean*], in Id., *Selected Works*, vol. 1, 177-178.

[134] Cf. P. Florensky, *Selected Works*, vol. 1, 550-551.

[135] Cf. *ibid*, vol. 2, 132-134.

[136] *Ivi*, 134.

In the same manner, Florensky began with the acceptance of *mathematical idealism* as a sort of dogma: a preliminary and purely theoretical treatment of mathematics as the sphere of divine prototypes both for the world and for human thinking. As the next step, he studied mathematics and used it to help him (and perhaps others) to join the Church (*mathematical catharsis* and *mathematical apologetics*), that is, to overcome rationalism and provide him with a formal framework for accepting Sophia. He found Bugaev's arithmology, Cantor's set theory, function theory, mathematical logic and probability theory most helpful on that very step. It was his "way up". Then, we made a shift of emphasis to his "way down". Now, the central idea was that of incarnation or embodiment and hence of symbol. Jesus Christ in this context was "the Symbol" (with a capital letter!)[137]. Mathematics was no more pure mathematics but instead the study of embodied forms taken in all their concreteness. Here, we met Florensky's project of *concrete mathematics* on a par with that of concrete metaphysics.

It is no surprise that the two complementary ways of treating mathematics cannot be clearly separated chronologically. Different strands of Pavel Florensky's interpretation of the role of mathematics within the ultimate priority of constructing a holistic world view intertwined to form one strong rope. Surely, there are some strands closely related to mathematics that I had to omit from this paper, for instance, a topic closely associated with the concretization of mathematics – "spatiality (*prostranstvennost'*)" and discontinuity in spatiality – one that was widely discussed by Florensky because he considered the characteristic of being spatial as a universal and fundamental one[138]. Alas, one cannot embrace the unembraceable, especially in a single paper.

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[137] Cf. P. Florensky, *Notebook 1904-1905*, 411.

[138] Florensky once said: «a world-understanding is a space-understanding (*miroponimanie - prostranstvoponimanie*)». See P. Florensky, *Znachenie prostranstvennosti* [*The Importance of Spatiality*] (1925) in Id., *Studies on the History and Philosophy of Art*, 272.