

## THE DAWN OF PARACONSISTENCY: RUSSIA'S LOGICAL THOUGHT IN THE TURN OF XX CENTURY

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**Abstract:** The paper deals with the factors which enabled N. A. Vasiliev to put forward in 1910 - 12 the idea of logics free of the laws of contradiction and excluded middle, the idea of metalogic and to construct his imaginary logic as novel non-classical system. It is shown that background of Vasiliev's ideas lies deeply in Russia's culture and particular approach to logical discourse. Several Russian scholars expressed ideas similar to Vasiliev's though not in such explicit form. This period might be called the prehistory of paraconsistency. Real history of paraconsistency starts with N.C.A. da Costa's works.

**Keywords:** N.A. Vasiliev. Imaginary logic. Metalogic. Heuristic prerequisites.

**We are the quickly dying flame  
And again burning fire.**  
*Nicolai A. Vasiliev (1904)*

### PREFACE. PREHISTORY OF PARACONSISTENT LOGIC

The birth and becoming of paraconsistency idea was determined both by the attempts of apprehension and critics of certain logical principles, as well as particular philosophical considerations. What kind of philosophical discourse and problems contributed to the **prehistory** of paraconsistency idea? What ideas may be regarded as heuristic prerequisites of paraconsistency? What Russian thinkers were concerned

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with philosophical problems explicitly and tacitly implied paraconsistency and opened paraconsistency era indeed? When the **real history** of paraconsistent logic emerged?

Being informal (and thus in certain sense fuzzy) philosophical ideas often serve as a good culture medium for pioneer scientific theories. Namely, the same fate had in store for the idea since 1976 known as paraconsistency. The critique of the law of contradiction from the standpoint of traditional dialectics corroded foundations of classical logic. This critique was inherent both for the philosophy of religion context (Father P. Forensky) or the quest for the new semantic approach to truth.

The program of logic construction on the basis of new ontology which permits contradictory objects/features and thus presupposes new sensational organization of person (the type of psychologism) led Nicolai A. Vasiliev (1910 – 1914) to the idea of imaginary logic, tolerant for contradictions (we should remind A. Meinong’s “impossible” objects as well, though Meinong’s goal was radically different).

## HEURISTIC PREREQUISITES OF VASILIEV’S IMAGINARY LOGIC

N.A. Vasiliev (1880 – 1940) is the precursor of paraconsistent logic due the papers appeared in 1910 – 1914 **where he put forward logic free of the law of (non)contradiction and excluded middle** (Bazhanov, 2008). (J. Lukasiewicz with his 1910 work dealing with critical assessment of the law of contradiction usually considered as another forerunner). Vasiliev’s path to imaginary logic was steep and toilsome. The starting point of his way to be found in youth animations and “vague sensations” of the future scholar related to the radically new treatment of contradiction and approach to logic.

A close look at Vasiliev's life and work shows us that he is not only the founder of original non-classical logical systems, a forerunner of paraconsistent logic but a thinker with very wide interests – philosopher, ethician, psychologist, historian, poet and even skilled interpreter. All components of Vasiliev intellectual activity are bounded.

***What vague, uncertain and barely formulated analogies fed Vasiliev's pioneer work? To my mind they can be specified due to my findings:***

1) *C.S. Peirce's logic of relatives, which Vasiliev learned when he was only seventeen;*

2) *Symbolist poetry that paid a great deal of attention to the subject of "another worlds";*

3) *Special psychological standpoint and approach used for the critical assessment and analysis of Aristotelian logic;*

4) *Charles Darwin's ideas on the evolution of life;*

5) *Analogy with non-Euclidian geometry construction and method* (Bazhanov, 2001).

In **C. S. Peirce's logic of relatives** (mid and late 1890-s) Vasiliev perceived the evidence of Aristotelian logic imperfection, the narrowness of traditional theory of judgements, he realized the principal possibility of different ways of logical reasoning, the non-absolute character of classical logic and its basic laws. He carefully read and had epitomized the article by C. S. Peirce "The Logic of Relatives" (1897). Vasiliev for the first time learned from Peirce that the presentation of logic is possible not only in, so to speak, the Aristotelian form (Bazhanov, 1992).

As a **symbolist style poet** Vasiliev is the author of the collection of poems "The Longing for Eternity" (1904) where he spoke not only about "another worlds" but endowed – unlike the rest of **Russian symbolists** - these worlds with contradictory features.

*Vasiliev's psychologism* helped to propose radically new – paraconsistent in essence – system of logic. In our world, Vasiliev affirmed, only “positive” sensations are possible, by which we can distinguish only contrary qualities. This is the basis of qualitatively different types of judgements – affirmative and negative. If one imagines a world in which not only positive but negative sensations are possible, then such a world will indeed require a new type of logic. As the imaginary world becomes more complex, logic becomes more complex too, and perhaps will be not of two “dimensions” (as Aristotelian logic), but, generally speaking, of any number of “dimensions”. The law of excluded fourth should be replaced, say, by the law of excluded  $n$ -th.

According to Sigwart **Darwin's ideas emerged revolution not only in biology but in logic** as well. Vasiliev claims that Darwin's ideas has direct impact to the foundations of logic. Aristotelian logic implicitly was based on ontological assumption of invariability of the world and concepts. Darwin shake this conviction and pierced the way to the new worldview. According to this worldview the concepts are due to develop and to transform. The urgent reform of logic to make this science deal with the variable concepts requires new logic.

“Imaginary logic is constructed by **imaginary geometry method**... In order to implement this method I have learned the non-Euclidian geometry... From all non-Euclidian geometry systems I have had more intently studied the geometry of Lobachevsky, which I learned from his original works”, – Vasiliev stated (Vasiliev, 1912, p. 20-21). Non-Euclidian geometry gave a powerful heuristic impetus to the imaginary logic construction.

Vasiliev persistently stressed the **primacy of an ontological aspect of logic**. By changing the ontology, combining the features of reality, we can get different imaginary logics, since the method of imaginary logic opens up the possibility of experimentation in logic, of giving up certain logical principles and seeing what comes of this rejection.

tion. This method resembles the “experimental methods of the natural sciences” (Vasiliev, 1912, p. 20).

Nevertheless *not only these vague prompts fed scholars inspiration toward new logic.*

Assessing movement towards new logic Vasiliev mentions following **landmarks:** *Hegel’s dialectical logic, Mill’s inductive logic and his critical approach towards Aristotelian syllogistic, Sigwart’s critique of the classical doctrine of modal judgements and, at last, the development of mathematical logic by G. Boole, E. Schroder, P.S. Poretsky, G. Peano, G. Frege and B. Russell* (Bazhanov, 1998).

According to Vasiliev the break through the horizon of traditional logic have been taking place in several points. First of all, one of the basic laws of Aristotelian logic – the law of contradiction, was severely criticized by the philosophers assigned to dialectical trend. They were seeking in the world the realized contradiction and its reflection in human consciousness (Nicholas Cusanus, Johann Georg Hamann, Georg Hegel, Julius Bahnsen, Alexis Meinong).

## TURNING POINT: INTERPRETATION OF PARTIAL JUDGEMENTS

Vasiliev judged that the stumbling bloc is actually the sense and interpretation of partial propositions. So far this interpretation was very uncertain and tangled, claimed Vasiliev.

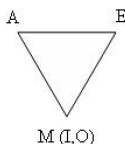
Partial proposition expressed in the form “Some  $S$  are (not)  $P$ ” ( $I$  or  $O$ ). What does “Some” mean? There are two meanings: 1) “Some and possibly all”; 2) “Some but definitely not all, just certain”. Most logicians due to Vasiliev adopt the first meaning.

When we claim that some triangles have a right angle or some people have grey hair then the word “some” means “not all”. If we understand “some” within the first meaning then factually we have

two propositions: “Not all  $S$  are  $P$ ” and “Some and possibly all  $S$  are  $P$ ”. The latter proposition is ambiguous for it implies two propositions “All  $S$  are  $P$ ” and “Only some  $S$  are  $P$ ”.

For the partial proposition we can find the form when we can think  $O$  and  $I$  explicitly. When I use “Some (not all)  $S$  are  $P$ ” then simultaneously we mean that “Some (the rest)  $S$  are not  $P$ ”, i.e. “Some  $S$  are  $P$  and some  $S$  are not  $P$ ”. According to Vasiliev, this is the true form of partial propositions. Their joint content is equivalent to  $O$  and  $I$  (marked by  $M$ ), and really is the true form of partial propositions.

For this reason a partial proposition is not subordinate to the universal but an independent proposition with the same rights (status) as  $A$  and  $E$ . This fact could be embodied in the triangle of opposition.



Thus, we have three types of propositions - affirmative ( $A$ ), negative ( $E$ ), accidental ( $M$ ). One of them is true, the fourth is impossible.

We should introduce the new comprehension of the notion of negation which is based upon the incompatibility of objects/features. If we imagine ‘contradictory’ worlds and thus persons with different from telluric types of sensations then we should introduce new classes of negation, and we should give up the law of contradiction and conceive the logic free of this law.

## VASILIEV’S NOTION OF METALOGIC

As the imaginary world becomes more complex, logic becomes more complex too, and will perhaps not be of two dimensions (as in Aristotelian logic) but, generally speaking, of any number of dimensions.

Thus, Vasiliev adopted the psychological interpretation of logic, which in the case of imaginary logic happened to be heuristically fruitful (if we remind the birth of paraconsistent logic).

According to Vasiliev in any logic there are laws enabling propositions and reasoning (the “formal” aspect of logic) which forms **metalogic**. Vasiliev proposed to call it the law of absolute distinction of truth and falsity, or **the law of non-self-contradiction**. The minimum of logical laws required for reasoning constitutes a metalogic – the science of structures valid for every logical system.

## RIPENING OF NON-CLASSICAL LOGIC IN RUSSIA’S SCIENCE, RELIGION, AND CULTURE

As early as 1901/1902, S. O. Shatunovskii from Odessa proclaimed that the law of excluded middle is not valid for infinite sets by arguing that the law of excluded middle is only valid for objects that may be considered constant in relation to some other object.

Father Pavel Florenskij discussed the idea of the probabilistic treatment of judgments in the historical sciences in his theological work *The Pillar and Affirmation of Truth* (1914). He introduced the concept of the “ladder” of moral expectations related to the firmness of our faith. Learning on S. Jevon’s works, Florenskij proposed a table of the degree of faith ranging from  $+\infty$  to  $-\infty$ . Thus, Florensky came close to the idea of probabilistically comprehended truth values in mathematical logic. Florenskii justifies contradictory premises by reasoning for a Higher spiritual cognition and the inconsistency of the Holy Writ due to its divine origin.

Some gleam of non-classical ideas related to the critique of the law of contradiction may be detected in the works of A. I. Vvedenskii and N. O. Losskii. In 1928 the quest for novel – dialectical - logic of natural sciences resulted in the logic of compatibility of propositions, happened

to be the first ever version of relevant logic, constructed by Ivan. E. Orlov (Dosen, 1992; Bazhanov, 2003).

### **REAL HISTORY OF PARACONSISTENT LOGIC: NEWTON C.A. DA COSTA**

All these events belong to the prehistory of paraconsistency. The **real history** starts with the discursive logic of S. Jaskowski (1948), D. Nelson and T. Smiley (1959), and especially works by N.C.A. Da Costa (1958 and later). The most important contribution to the development of paraconsistent logic was made by Newton C.A. Da Costa, his pupils and close colleagues (Da Costa, 1958; Arruda, 1977; Arruda, 1980; Da Costa, Beziau, Bueno, 1995). Their vigorous research made paraconsistent logic highly respected and advanced field of research.

When I met Newton Da Costa in Moscow in August of 1987 he told me that he was stunned when he learned that already in 1910 the idea of logic tolerant to the contradiction was outspoken by Nicolai Vasiliev, unknown Russian scholar.

Vasiliev's idea of the *plurality of logical systems* has been realized. "I am very well aware of the fact, – wrote Vasiliev in 1912, – that my idea of new logic contradicts the millennial conviction of mankind. . . I'm risk falling under the charge of logical heresy" (Vasiliev, 1912, p. 246).

At present moment we see that this logical heresy is the indefeasible element of everyday life of modern logic.



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