

## **Toward the Reconstruction of the Early History of Paraconsistent Logic: The Prerequisites of N.A.Vasiliev's Imaginary Logic**

V.A.Bazhanov

P.O.Box 1602, Ulyanovsk-63, RUSSIA, 432063

bazhan@ulsu.ru

Ulyanovsk State University

### **Abstract**

On the basis of recently unknown archive and manuscript documents the article reveals the informal and heuristic prerequisites of N.A.Vasiliev's imaginary logic.

N.A.Vasiliev's imaginary logic (1908 - 1914) became precursor of paraconsistent logic. His 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.

At present moment we are able to reconstruct the very early history of N.A.Vasiliev's imaginary logic and its formal or informal prerequisites and heuristic prompts. It is possible due to the the discovering of scholars personal archive and unknown before early 1990-s his works and letters. Some Soviet scientists worked diligently but unsuccessfully to find the archives of the Vasiliev's family (for instance, prominent algebraists A.I.Mal'tsev and V.V.Morozov). I too engaged in this search, and was fortunate to find two of his logical manuscripts and the "remains" of archive (diary, letters, photographs, books with Vasiliev's annotations, etc.) . This material enabled me to write a scientific biography of Vasiliev and study his way to imaginary logic [1] and in collaboration with V.A.Smirnov to publish for the first time in Soviet era the works of N.A.Vasiliev itself [2]. Later some new documents and Vasiliev's unknown papers were found by me.

A close look at Vasiliev's life and work shows us that he is not only the founder of original non-classical logical theories, 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 new findings:

- 1) C.S.Peirce's logic of relatives, which Vasiliev learned when he was only seventeen ;
- 2) the symbolist poetry that paid a great deal of attention to the subject of "another world";
- 3) the 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) the analogy with non-Euclidian geometry construction and method.

Soon (according to historical scale) after Kant wrote his Preface to "CRITIQUE OF PURE REASON" in Aristotelian logic the powerful movement emerged, resulted in eventual drastic changes in logic. Assessing this movement Vasiliev names its 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 Boole, Schroder, Poretsky, Peano, Frege and Russell.

The break through the horizon of traditional logic, according to Vasiliev, have been taking place in several points. First of all, one of the cornerstone laws of Aristotelian logic - the law of contradiction, was severely criticized by the philosophers assigned themselves to dialectical trend. They were seeking in the world the realized contradiction and its reflection in human consciousness (N.Cusanus, Hamann, Hegel, Bahnsen, Meinong).

These are the rational, formal, so to speak, prerequisites of imaginary logic - as Vasiliev himself assessed the predecessors of the new logic tolerant to contradiction. Nevertheless not only rational prompts fed scholars inspiration toward new logic free of the laws of contradiction and excluded middle in 1908-1910.

We may argue that in Ch.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 and its elements, he realized the principal possibility of different ways of logical reasoning, the non-absolute character of classical logic and its basic laws [3]. As Vasiliev's diary show at the age of seventeen he carefully read and had epitomized the article by Ch.Peirce "THE LOGIC OF RELATIVES" [4]. From this paper Vasiliev for the first time learned that the presentation of logic is possible not only in, so to speak, in the Aristotelian form and the different principles of logic might be in the fore.

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 [1, p. 44 - 57]. Say, he described the imaginary world in which "the wolf is resting with the sheep/ the innocent victim with the hangman/ the laugh is like tears...". Several years later he would proceed with his poetical treatment of "another worlds" using the logical language capable to deal with contradiction.

Symbolist poetry of Vasiliev is saturated with subtle psychological content. Thus there is no wonder that Vasiliev entered Kazan University medical faculty having realized that psychological studies require deep biological and medical knowledge. After visiting Germany and participating at the International Philosophical Congress in Heidelberg, he became convinced that psychology is merely a preparatory stage for logic though his logical reasoning preserved strong psychological tinge.

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 different logic. and the introduction of supplementary qualitative judgements. 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.

According to Sigwart, Darwin's ideas emerged revolution in logic. Vasiliev claims that his ideas have direct impact to the foundations of logic. Aristotelian logic implicitly was based on ontological assumption of invariability of the world and concepts. Darwin has shaken this conviction and opened the way to the new worldview [6]. According this worldview the concepts are due to develop and thus vary. Hence, it requires the urgent reform of logic to make this science deal with the variable concepts.

"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 [6, p.20-21]. Non-Euclidian geometry gave a powerful impetus to the imaginary logic construction [7].

In Aristotelian logic, as Vasiliev put it, we have two different types of judgements (in respect to their quality), which characterize the subject-predicate relation, namely the affirmative and negative judgements. In Vasiliev's logic there are three classes of judgements, - affirmative,

negative and so called "indifferent". Thus "the dichotomy of our ("telluric") logic and of our geometry is transformed to the trichotomy of imaginary disciplines" [2, p.81].

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. This method resembles the "experimental methods of the natural sciences"[2, p.120].

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". Half a century had to pass before the ideas of imaginary logic revived like Phoenix from the ashes; and we may evoke their fate in the words of Emile Verhaeren - the poet, beloved and translated in to Russian by Vasiliev: " Now comes the time for things / Which seemed a delirium yesterday."

#### References

1. Bazhanov, V.A. Nicolai Alexandrovich Vasiliev (1880 - 1940). Moscow, Nauka press, 1988 - 144 p. (in Russian)
2. Vasiliev, N.A. Imaginary logic. Selected papers, Moscow, Nauka press, 1989. - 263 p.(in Russian)
3. Bazhanov, V.A. C.S.Peirce's influence on the logical ideas of N.A.Vasiliev. MODERN LOGIC, 1992, vol.3, N 1, p.45 - 51.
4. Bazhanov, V.A. The fate of one forgotten idea: N.A.Vasiliev and his imaginary logic. STUDIES IN SOVIET THOUGHT, 1990, vol. 37, N 3-4, p.143-151.
5. Bazhanov, V.A. The prerequisites for N.A.Vasiliev imaginary logic. In: Modern logic: theory, history, applications. Leningrad, 1990 ,p.7-9; Bazhanov, V.A. The heuristic impact of Ch.Darwin's ideas on construction by N.A.Vasiliev of imaginary logic. In: X All-Union conference on logic, methodology and philosophy of science. Minsk, 1990, p.6-7. (in Russian)
6. Vasiliev N.A. Report on academic activities in 1911-1912. Manuscript.
7. Bazhanov V.A. The imaginary geometry of N.I.Lobachevsky and imaginary logic of N.A.Vasiliev. MODERN LOGIC, 1994, vol. 4, N 2, p.148 - 156.