# Review of the book: *N.A. Vasil'ev and His Imaginary Logic*[*]

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In a book that appeared in 2009 in Russia,Valentin Bazhanov[1] presented a biography of N. A. Vasil'ev[2] (1880-1940), which has been a Professor in the University of Kazan at the beginning of the last century. Vasil'ev invented a logical system that he named *imaginary logic*. His logical program anticipated some of the more fecund lines of contemporary logic.[3]

Bazhanov brought to us many facts concerning the personal and intellectual life of Vasil'ev, which unfortunately have remained in the shadows until our days.

This brilliant Professor of Kazan, has given much proof of his multifarious talent during his life. He was a medical doctor, but while working in University of Kazan he developed interest in Psychology, Philosophy, Methodology and Logic. In this last discipline he made indeed a great contribution. Besides that he also wrote poetry and made many translations to Russian of many different subjects. In 1904 his selected poems were published under the name of *Longing for Eternity*.

The disrupts of the first two decades of the twentieth century affected in several ways Vasil'ev, in particular by taking of the provincial tranquility of earlier Kazan's day life. On October 22nd, 1914, he began his mandatory service in the army being nominated as a doctor in 'Kazan military and sanitary circumscription of reserve'. His activity as a doctor during the war disturbed his life forever. His contact with the degrading situation of the Russian army, with the desperate situation of the people that were coming from the front, produced a depressive illness in Vasil'ev, which frequently accompanied him until the end of his life (page 54). As a result of his depression in 1916 he has been admitted to the 'Dr. S. A. Liozner Psychiatric Hospital', near Moscow, for the first time. On the 3rd of November in 1917 during those decisive days that have shaken

[*]author: Valentin Bazhanov, published by Canon, Moscow, 2009.

[1]Eventually also translated as Bajanov and even Bažanov.

[2]Alos translated sometimes as Vasiliev, Vassilieff and even Wassilieff. See http://en.wikipedia.org/wiki/Nicolai_A._Vasiliev

[3]But not only that, in particular, A. Morreti considers that Vasil'ev is also the precussor of **NOT** ($N$-Opposition Theory), a new branch of mathematics, similar to, but different from *graph* theory and *knot* theory. See, http://alessiomoretti.perso.sfr.fr/NOTHome.html

the world, he wrote to his wife, Ekatierina Stepanovna Zavialova, to inform her that, after a very difficult combat, Moscow was taken by the Bolsheviks and it looked as though peace had come to the city, so, "we can write letters now (page 45)".

Concerning Vasil'ev's Psychology's courses at University of Kazan, the academic A. P. N. Luria, once wrote that "in his conferences about Psychology, we can come across many pages dedicated to the brain and interesting reflections about the personality, and we must remember that these conferences happened in the beginning of the last century (page.47)."

In the autumn of 1921 University of Kazan gave to the members of its academic staff a questionnaire to fill out. There, people were asked about the research areas of their interests. Vasil'ev answered the following: 1) Logic; 2) Psychology; 3) History of Conceptions.

In the beginning of 1922, when Vasil'ev was living again a depressive episode, he retired from his university job and has been admitted to the Hospital of Kazan's University. From time to time when he felt better he usually went to visit Kazan, but the Hospital became his definitive address until the end of his life. In 1940, on the 30th of October, N. A. Vasil'ev died.

As to his contributions to the history of Logic, without doubt, his most important essays are *The Imaginary Logic* and *Logic and Metalogic*. The first essay, whose theses have been published in English in the *Annals of International Congress of Philosophy*, that happened in Naples, in 1924, brought the proposal to build other logical systems by the suppression of some of the axioms of Aristotelian's traditional logic. Vasil'ev proposed there the indifferent judgment, a kind of statement with contradictory predicates ($A$ is $B$ and $\breve{}B$), whose contradiction would not disturb the consistency of the new logical system, because that contradiction was only internal to the statement, that is, *intrastatemental* contradiction and not an *interstatemental* contradiction.

As Professor Bazhanov remarked, "the distinction between the material aspect and the formal aspect presupposes two formulations of the principle of contradiction. One thing is to consider the question: does the principle of contradiction forbids the simultaneous existence of incompatible predicates?; and another thing is the question: does this principle determines that one and the same judgment cannot be simultaneously true or false?. The first postulate is expendable, as it happens in imaginary logic; the second remains sound to any one logical system that can be thought. It is a necessary condition for logical reasoning. Indeed, it puts limit to the cognizant subject: it forbids him to contradict himself. Vasil'ev named the second postulate the law of absolute distinction between truth and falsity, or principle of non-autocontradiction. The principle of contradiction, in its material aspect, doesn't concern the subject, but the world, and the principle prohibits the contradiction in the exterior world. We must remark that the belief in impossibility of contradictions in the objective reality is one of the starting points of Vasil'ev's logical program, which he has frequently supported".

Bazhanov continued his writings saying that "Vasil'ev considered the *principle of contradiction* to have real and empirical properties[4]. 'Empirical' means that the principle of contradiction reflects the existence of incompatible predicates and properties in our world; it condenses our daily experience in itself, it is an abbreviated formula of human practice, from which it is known that the color red and the color blue are incompatible (the color red is not the color blue), as like noise and silence. The principle of contradiction is real because it reflects the state of things in our objective world. It means that this law is based on the presupposition of its material nature, which is strictly bound to the empirical status of the negation."

"Simultaneously, the formal principles of thought, as commands the principle of non-contradiction, are sound only in the sphere of the thought, since they are concerned only with judgments and concepts. Another formal principle of thought is the law of sufficient reason (every judgment must have its reason). We must not confuse it with the principle of causality (every phenomenon must have a cause). The following analogy seems admissible: the principle of contradiction is related to the formal law of non-autocontradiction, exactly as the principle of causality is related to the law of sufficient reason."

As it is known, for the foundation of his logical program, Vasil'ev was inspired by the program of Lobachevskian's geometry. About this theme, Bazhanov wrote in Chapter 9 of his book (p.152) that according to Vasil'ev: "The possibility of another kind of geometry persuades us of the possibility of one logic different from Aristotelian logic."[5]

Bazhanov continues his discourse saying that the fact concerning the possibility of other geometries besides inspiring Vasil'ev giving him impulse for his project also gave him something more:

"The imaginary logic is built by the method of imaginary geometry... to reach my goal, I had to study non-Euclidian geometries... among all systems of non-Euclidian geometries, I dedicated special attention to Lobachevskian's geometry on which I devoted my time, going through his works[6]."

Brazilian logicians have special eminence in Bazhanov's book. This is so, perhaps because Bazhanov likes a statement of Ayda I. Arruda[7], qualifying Vasil'ev instead of Lukasiewicz as the precursor of *Paraconsistent Logic.* Lukasiewicz should only be considered as the one who inspired the non-classical logics as a whole.[8]

[4] N. A Vasil'ev, *The Imaginary Logic*, p. 220, Kazan, 1912.

[5] This is a disputable issue as has been dicussed by Charles Duffy in his review (Mod. Log. **1**(1), 71-82(1990).) of a previous Bazhanov book (*Nikolai Aleksandrovich Vasil'ev*, Moscow, Nauka, 1998). See: http://projecteuclid.org/DPubS?verb=Display&version=1.0&service=UI&handle=euclid.rml/1204834541&page=record

[6] N .A. Vasil'ev, *Report on Teaching* ( pp. 21 and 22), 1912.

[7] A. I. Arruda, A Survey of Paraconsistent Logic, in A. I. Arruda, R. Chauaqui, N. C. .A. da Costa (eds.), *Matheamtical Logic in Latin America*, North-Holland, Amsterdam, 1980.

[8] Of course, there are some strong claims against Arruda and Bazhanov views, e.g., (F. Cavaliere, Review of Imaginary Logic, *Mod. Log.* **2**(1), 52-76, (1991)). See: http://projecteuclid.org/DPubS?service=UI&version=1.0&verb=Display&handle=euclid.rml/1204834791

Bazhanov recalls that we could also consider Vasil'ev (as proposed by V. A. Smirnov), as the creator of a particular class of logic, the *Multidimensional Logic*. In this special class of logic, each judgment according to its quality corresponds to one dimension. Indeed, in the first presentation of his imaginary logic, Vasil'ev exhibited three kinds of judgment's dimensions (affirmation, negation and the indifferent judgment).

Vasil'ev established very clearly that we can give gradations for judgments, making then possible the construction of different logical systems, such that distinct logical systems would correspond different gradations of judgments. For example, he said that, for one logical system of $n$-dimensions, the principle of $(n + 1)$ excluded is always sound[9].

I end this brief review observing that the above question and its consequences for which concerns the criticism on the principle of excluded middle for intuitionism does not receive the attention it deserves in *Imaginary Logic* and also in Vasil'ev's essay *Logic and Metalogic*, where the logician of Kazan, inspired by Hilbert's distinction between mathematics and metamathematics, proposes, for the first time, a clear distinction between logic and metalogic, a distinction, that as it is today well known, is crucial for the study of logical languages and the understanding of their relations.[10]

[9] That means that for one logical system consisting of three dimensions, the principle of "quartum non datur" is sound, for one logical system of four dimensions, the principle of "quintum non datur" is sound, etc.

[10] For those readers eventually interested in a contemporary presentation of Vasil'ev imaginary logic we suggest (besides Arruda essay already quoted) the paper: G. Priest, Vasil'ev and Imaginary Logic, *History and Philosophy of Logic* **21**(2), 135-146 2000. See: http://dx.doi.org/10.1080/0144540050064031