

GRANDFATHER OF FUZZY LOGIC ?

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Dennis Darland recently posted the following message in G-BERTIE, the electronic List for discussion of Bertrand Russell and his work:

I have recently finished *Fuzzy Thinking* by Bart Kosko. He says, "... Bertrand Russell found a paradox that ended the certainty in math that had prevailed since before the time of Aristotle. For this and many reasons Russell is the grandfather of fuzzy logic." (p. 98) He also quotes Russell often. One quote is, "All traditional logic habitually assumes that precise symbols are being employed. It is therefore not applicable to this terrestrial life, but only to an imagined celestial one. The law of excluded middle is true when precise symbols are employed but is not true when symbols are vague, as, in fact, all symbols are." (p. 92; quoted from "Vagueness", Australian [sic] Journal of Philosophy, Volume I, 1923.

Questions about the Law of Excluded Middle (LEM) go back at least to Charles Peirce and N.A. Vasiliev. Peirce began kicking around the possibility of playing around with and altering the laws of logic (see Paul Carus, quoting a letter of Peirce, in "The Monist" 1910, pp. 44-45) possibly as early as 1895, inspired by non-Euclidean geometry's rejection of Euclid's parallel postulate after reading and reviewing for 'The Nation' Halstead's 1894 English translation of A.V Vasiliev's (i.e. N.A. Vasiliev's father's) book on Lobachevsky. N.A. Vasiliev also began thinking about these possibilities at about the same time. And in 1910, partly triggered by reading the Carus article and partly inspired by Lobachevsky's geometry, explicitly developed a logical system without LEM [and also without the Law of Non-Contradiction], which he called "imaginary (nonaristotelian) logic" in analogy with Lobachevsky's "imaginary" (non-Euclidean) geometry. N.A. Vasiliev began working out the technical and philosophical details of his system from 1910-1913. For this episode, see, e.g. V.A. Bazhanov, "C.S. Peirce's influence on the logical work of N.A. Vasiliev," *Modern Logic* 3 (1992), 45-51, and Note for 166.6-10 of C.J. Kloesel, *et al.* (editors), *Writings of Charles S. Peirce: A Chronological Edition*, Volume 5: 1884-1886 (Bloomington/Indianapolis, Indiana University Press, 1993), 439.

We may add [parenthetically] that Post didn't publish on m -valued logics until 1920 and that Łukasiewicz also published his paper on 3-valued logic that same year.

Since Darland gives the Russell quote on LEM from a 1923 publication, it would be interesting to research the question of when and how Bertrand Russell came to express his doubts about LEM. The most likely prospect is that Russell heard about N.A. Vasiliev's non-Aristotelian logic from A.V. Vasiliev, since, as V.A. Bazhanov points out (personal communication, 23 March 1994), Russell met A.V. Vasiliev in Saint-Petersburg in 1920

and had lengthy discussions with him on numerous topics. A.V. Vasiliev's book *Space, Time, Motion* is dedicated to his son N.A. and was published in London with Russell's "Preface."

(Also worth asking: What relation, if any, does fuzzy logic have with paraconsistent logics such as Vasiliev's? What relation, if any, does fuzzy logic have generally with many-valued and probability logics? What are the characteristics of fuzzy logic which distinguish it, if at all, from these other non-classical logics?