

Bell, Bohm, and von Neumann: Some philosophical inequalities concerning No-go Theorems and the axiomatic method

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Abstract

The paper investigates the philosophical relationship between John von Neumann's No-hidden-variable theorem and Bell's inequalities. Bell erroneously takes the axiomatic method as implying a finality claim and thus ignores von Neumann's strongly pragmatist stance. If one considers, however, Hilbert's axiomatic method as a critical enterprise, Bell's theorem improves von Neumann's by defining a more appropriate notion of 'hidden variable' that permits one to include Bohm's interpretation which recovers the predictive content of quantum mechanics. Contrary to Bell's belief, accepting this model does not require adopting the metaphysically realist Bohm picture. If one takes the latter as a physical research programme one sees that it only partly disputes a common domain of facts with the mathematically oriented research programme of von Neumann.

Keywords: Bell's theorem / quantum mechanics / hidden variables / John von Neumann's methodology / Hilbert's axiomatic method / No-go theorems / Bohm interpretation / Lakatosian research programmes.

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