

The influence of Poincaré on the Vienna Circle of positivistic philosophy

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The various philosophical roots (Mach, Poincaré, Duhem, Russell, Wittgenstein) of the so-called Vienna Circle of positivistic philosophy have been repeatedly investigated in predominantly German publications by Rudolf Haller (1993), Friedrich Stadler (1997), and most recently Matthias Neuber (2010). The latter stresses the role of Abel Rey as a communicator of Poincaré's conventionalism to the "first" Vienna Circle (1907-1912), pointing to the political aspects and potentials for the Circle, whose members were acting mostly on the left, even socialist wing of German-Austrian academia. The philosophical influence of the Vienna Circle and of the Unity of Science movement has been waning after WWII not least due to the Circle's emigration to the United States and the different social and philosophical conditions there. However, Poincaré's philosophical and scientific influence on the Circle via the work of the latter's two main scientific heroes, Einstein and Hilbert, has retained interest and has been traced in many international publications in recent decades.

The talk will briefly summarize some of the main results of the two lines of research mentioned above, mainly from the perspective of one of the first members of the Vienna Circle and biographer of Einstein (1947), Philipp Frank, pointing in particular to the contradictory influence of Poincaré's on mathematical axiomatics and logic.

In its second part the talk points to the recent rediscovery of Poincaré's influence on the theory of probability, which was partly philosophical in nature. The topic is connected to Poincaré's impact and/or failed impact on the physicist Philipp Frank and the mathematician Richard von Mises who have been called the "Two Strongest Pillars of the Empiricist Wing of the Vienna Circle." Their work on causality in physics was partly stimulated by Poincaré, but it ignored the latter's ideas in probability which were pointing into the direction of causality, based on P.'s general mechanist convictions. It will be argued that this ignorance is partly connected to the axiomatic and positivistic mind of Frank and von Mises, instilled into them by Hilbert and Mach, partly conditioned by their desire to account for principled indeterminism, caused by developments in quantum mechanics in the 1920s. By way of contrast, an ally of and indirect contributor to the work of the Vienna Circle, Hans Reichenbach in Berlin, used Poincaré's ideas about the mechanical explanation of a priori probabilities (1902) for his – compared to Frank and von Mises – much more philosophical approach to probability theory (1915). In recent decades Poincaré's "method of arbitrary functions" has been revived in statistical mechanics and the theory of dynamical systems, apparently connected to a turn towards applied mathematics in recent decades. It figures prominently in Jan von Plato's philosophically and historically inspired "Creating Modern Probability" (1994). The French historian of stochastics, Bernard Bru, has recently (2003) elaborated on a fact discovered already by von Plato, namely that the second edition of Poincaré's theory of probability (1912) contains - in addition to the "method of arbitrary functions" - stimuli for the theory of Markov chains. These stimuli had been ignored by mathematicians at least until the International Mathematical Congress in Bologna in 1928 and have been ignored by most historians of probability theory ever since.