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THE EMERGENCE OF FRENCH PROBABILISTIC STATISTICS. BOREL AND THE INSTITUT HENRI POINCARÉ AROUND THE 1920S

Rémi Catellier & Laurent Mazliak

Abstract. — This paper concerns the emergence of modern mathematical statistics in France after the First World War. Emile Borel's achievements are presented, and especially his creation of two institutions where mathematical statistics was developed: the *Statistical Institute of Paris University*, (ISUP) in 1922 and above all the *Henri Poincaré Institute* (IHP) in 1928. At the IHP, a new journal *Annales de l'Institut Henri Poincaré* was created in 1931. We discuss the first papers in that journal dealing with mathematical statistics.

Résumé (L'émergence de la statistique probabiliste française. Borel et l'Institut Henri Poincaré dans les années 1920)

Cet article concerne l'émergence de la Statistique mathématique moderne après la Première Guerre mondiale en France. On y présente les travaux d'Emile Borel, et notamment la création de deux institutions où la statistique mathématique se développa: l'ISUP (Institut de Statistiques de l'Université de Paris) en 1922 et surtout l'Institut Henri Poincaré (IHP) en 1928. A l'IHP, un nouveau périodique, les *Annales de l'Institut Henri Poincaré*, fut créé en 1931. Nous examinons les premiers articles qui y traitaient de statistique mathématique.

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INTRODUCTION

The important transformations in the field of mathematics of randomness between 1900 and 1930 are now rather well understood. Several large-scale studies have been published which present wide pictures of the actors and ideas involved in what may be considered as a major evolution in the scientific life of the 20th century. See in particular several chapters in the two volumes of the monumental treatise [Kruger et al. 1987] and fundamental book [Von Plato 1994]. These books have been complemented by many recent papers concerning more detailed aspects of this story (see among numerous others [Bru 2003], [Havlova et al. 2005], [Siegmund-Schultze 2006] and other references in these papers). Yet it seems that these studies are often more specifically centered on the probabilistic aspects of the question than on the statistical side. When one consults the recent, very comprehensive collective work on statisticians edited by Heyde and Seneta [Heyde & Seneta 2001], it is striking to see that many of those who are mostly known today as specialists in probability theory were also involved in the shaping of modern mathematical statistics. This includes for example the Austro-German Richard von Mises, the Soviets E. B. Slutzky, A. Y. Khinčin and A. N. Kolmogorov, the Italian Guido Cantelli and naturally, the French Emile Borel about whom we shall write at length below. Though basic tools of the modern theory of probability (especially the use of Borel's measure theory of sets and the Lebesgue integral) had been available since the 1910s in France, it took a long time for mathematics of randomness, above all the most modern ones, to penetrate the quite reluctant and suspicious world of field statisticians who preferred the use of descriptive methods without deep mathematical theory. The present paper approaches how eventually mathematical statistics slowly emerged in the 1920s; more precisely, as the title of our paper shows, we are interested in the introduction of probabilistic methods in the statistical field. Let us mention that this question has already been studied, especially by Desrosières in his impressive book [Desrosières 2000] where a wide panorama of the international situation is provided. More particularly, in France, we can also mention among others the paper [Meusnier 2006]. Our paper seeks to provide further information on the

French situation and its relations with what was happening abroad, and how the link was finally drawn between probability and statistics.

As already mentioned, Emile Borel (1871–1956) was a central actor in this transformation, as were his successors Maurice Fréchet (1878–1973) and Georges Darmois (1888 -1961). By means of original pedagogical and scientific initiatives, the three men participated in the setting up of two institutes in Paris, the *Institut de Statistiques de l'Université de Paris* (ISUP) in 1922, and above all the *Institut Henri Poincaré* (IHP) in 1928 where mathematical statistics was presented and recent findings in the subject described for the first time in France. A good hint of the role played by the aforementioned mathematicians is that they were, between 1920 and 1950, the only mathematicians elected as President of Paris Statistical Society (SSP) (see [Mazliak 2010]).

Our work stems from the conference organized in November 2008 by Michèle Audin and Catherine Goldstein for the 80th anniversary of the IHP. The second author was invited to present a talk on the same theme as the present article. Moreover, this talk was largely inspired by a short memoir [Catellier 2008] written by the first author after a short research stay at University Paris 6 during Spring 2008. On that occasion, important new sources on the subject (archival material and various articles) had been collected. This work was likewise strongly connected to a large international research program about the mathematics around the Great War, initiated 6 years ago. This program opened up numerous new directions for the historiography of this period, which were in particular discussed during an international conference in 2007 at the CIRM (Marseilles, France).

In 1996, Stigler ([Stigler 1996]) proposed the somewhat provocative hypothesis that Mathematical Statistics began in 1933. Some facts presented in our paper may therefore appear as a contradiction to Stigler's thesis. This is in fact only partly the case. Reading Stigler's paper shows that the author concentrates mainly on the case of the United States; the obvious predominance of Anglo-Saxon statistics after the 1940s justifies particular attention on what happened in the USA during the interwar period. When we decided to scrutinize the French situation in the same period, we knew