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Borel, probability and *La Revue du Mois*

Laurent MAZLIAK¹

The monthly journal *La Revue du Mois* was founded in 1906 by Emile Borel and his wife Marguerite after Borel received 10000 francs from the Academy of Sciences of Paris as part of the Petit d'Ormy Prize. This was the period in French history immediately after the end of the Dreyfus Affair; in 1905 the separation law between Church and State was proclaimed. In many intellectual circles close to the Radical party there was a strong desire to raise the scientific culture of mankind, an expression of faith in scientific progress. This was particularly so in many protestant families for whom it promised a means of counterbalancing what was considered the obscurantist influence of the Roman Catholic Church. Borel belonged to this trend.

Marguerite, Borel's wife, was the daughter of the mathematician Paul Appel. She is known to literature as Camille Marbo : Marbo is a contraction of Marguerite and Borel. After her marriage Marbo began writing novels and in 1913 she acquired some fame with the novel *La statue voilée* (for which she received the Femina Prize). Marbo described the founding of *La Revue du Mois* in the autobiography [4] she wrote at the end of her life. The journal began as quite the family business for Borel and Marbo chose friends as collaborators. They decided to pay a fee for each article published, adopting the scale used by the *Mercure de France*.

A programmatic text probably written by Borel and his wife and describing the scope of the journal gave a clear idea of the spirit in which they founded it.

The number and the importance of questions that may be dealt with by the scientific method is increasing every day. It seemed to us that it was possible to conceive a publication based on this method, though not especially technical, and having as its essential aim to contribute to the development of general ideas by the exposition and the discussion of the progresses obtained in the knowledge of facts and of the movements of ideas which are their consequence.

La Revue du Mois tries to be this publication. Its main aim is to be a journal of free discussion, permitting the expression of any opinion with a scientific basis with complete independence. (. . .) The contents of *La Revue du Mois* are therefore sufficiently varied for any instructed person to be interested in it.

¹Laboratoire de Probabilités et Modèles aléatoires & Institut de Mathématiques (Histoire des Sciences Mathématiques), Université Paris VI, France. mazliak@ccr.jussieu.fr

And indeed, the journal soon demonstrated that it was an original attempt to provide its readers with a broad perspective on all aspects of culture. This included scientific as well as literary, artistic and political aspects. As Marbo writes : “A lot of people appreciated the opportunity to write on what they were interested in and collaborate to the journal.” Among the names, we find Painlevé, Blum, Herriot, Denis, Le Dantec, Poincaré and many others.

The atmosphere in which the journal was produced is also strongly evoked by the pages of advertisements at the end of each issue. They concerned books and reviews on all cultural themes, but also journeys (the opening of Simplon’s tunnel in June 1906 is mentioned), and even food : Borel, whose origins were in Aveyron, could probably do no less than publish a full page notice on Roquefort cheeses (August 1906) !

The first paper to appear was written by the great Italian mathematician Vito Volterra, a good friend of Borel, about the application of mathematics to biology. All kind of themes can be found in the various issues of the journal. Let us mention for instance “Aviation” by Borel in 1908, “Science at the theatre” by the Lalos, “Austria and the Serbs” by Denis in 1910. These examples illustrate the ambition of Borel and his wife that the journal take a modern and innovative look at all the various problems of the contemporary world.

The journal came to a brutal end with the outbreak of the First World War. In 1915, Bianconi, Borel’s help on the Editorial board, was killed at the front. In the same year, Borel was called to the army and left Paris. Publication ceased : in the last 1915 issue, the cessation was presented as an interruption until the “final victory”. But, in fact, the war had deeply affected belief in the progress of mankind through science and culture. Though several issues appeared in 1919 and 1920, the initial enthusiasm was no longer there. Borel became more and more directly involved in politics (he soon became deputy, mayor and even minister for some months). Closing was unavoidable, bringing to an end an original press utopia.

From the very beginning, the contributors were given great editorial freedom. They were asked to express themselves freely in their own words. As a result, many of the papers published in *La Revue du Mois* were very original and often had a visionary touch, particularly when they treated scientific and technological themes concerned with the future world. Of course, such freedom provoked controversies. The biologist Le Dantec, a brilliant personality who loved confrontation, was involved in several. As early as 1906, Le Dantec and Tannery had lively exchanges in the journal over the concept of conscience (Le Dantec’s sparkling style is specially obvious in his answer to Tannery in August 1906). Another controversy, on the concept of randomness, is of particular interest to us. Here Borel was the main opponent to Le Dantec.

Probability theory and philosophical arguments about randomness appear from the very start of the journal. Throughout his life Borel’s feelings towards probability were curiously mixed. On one hand he felt a kind of mathematical disgust towards such low-level mathematics : a notable proof of the fact is reported by Camille Marbo who wrote that her husband explained to her that he was wasting his time in calculus of probability as he had no more taste for high-level mathematics ([4], p 172). But, on the other hand, Borel clearly saw in probability one of the most promising fields for realizing his program of bringing scientific enlightenment to the general public. The book *Randomness* ([1]) published in 1914 appears as a kind of summit of the Borelian thought in that direction.

As early as 1906, Borel contributed an article on probability to the journal. In 1907, Borel boldly proposed to Le Dantec that he write an article presenting his arguments against the use of randomness as an explanatory scientific concept. Le Dantec accepted and offered a paper under

the title “Randomness and the question of scaling” ([3]) where he explains that it is nonsensical to speak of laws of randomness : the right explanation may in theory always be obtained through a change of scale. Microscopic considerations can explain macroscopic “randomness”. In particular, to speak about the probability of a single event is bad and even absurd metaphysics. Bru, Bru and Chung published the paper ([2]) in 1999 with a detailed commentary on the controversy between Borel and Le Dantec.

It was natural for Borel to ask their good friend the mathematician Pierre Boutroux (1880-1922) to write an article about randomness for *La Revue du Mois*. He was the son of the famous philosopher of science Emile Boutroux and in parallel with his mathematical work on differential equations he had been concerned with questions of the philosophy and history of science for a long time. In 1920, a chair of History and Philosophy of Science was offered to him at the Collège de France, but he had no time to take advantage of it as he died suddenly in 1922. The chair was discontinued ([5]). Boutroux published two important books in the history and philosophy of mathematics, *Les principes de l'analyse mathématique* (1914 and 1919) which presented the mathematics of the second decade of the twentieth century, both as a body of knowledge and as a mode of thought, and *L'idéal scientifique des mathématiciens dans l'antiquité et dans les temps modernes*.

Boutroux's article published in 1907 in the *La Revue du Mois* and presented in this issue of the *EJHPS* treats the origins of probability. Despite what we might consider a certain naivety in several places, the text shows an interesting and quite modern approach to history. Boutroux insists on the influence of the underground movement of trends and opinions. The history of the development of science cannot be reduced to a series of spectacular achievements. Boutroux does not hesitate to take his examples from the work of scientists who had been largely ignored. Thus he writes at length about the 17th Century Spanish Jesuit Caramuel y Lobkovitz whose work he regards as a good illustration of the way reasoning on probabilities was used to discuss problems which had been treated before only by scholastics. In this article from 1907 one can sense a challenge to the positivistic point of view that in the interwar period would produce such major transformations of historical sciences as the creation of the so-called *Ecole des Annales* by Bloch and Fèvre.

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