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Chapitre 10 : entretien avec Eugene Seneta

ou écrire avec « d'autres » en histoire des sciences

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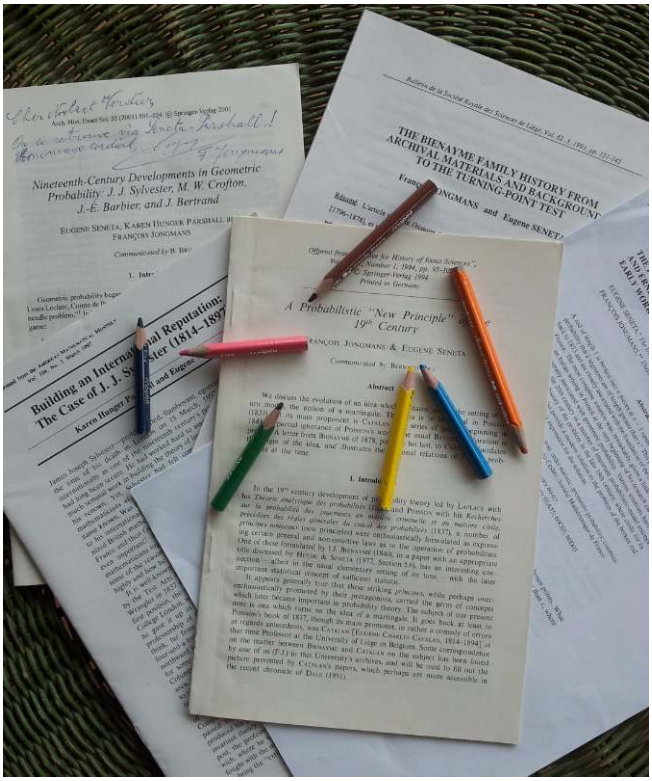
Chapitre 10

ENTRETIEN AVEC EUGENE SENETA
OU
ÉCRIRE AVEC « D'AUTRES » EN HISTOIRE DES SCIENCES

Eugene Seneta



Eugene Seneta [[Seneta]] – professeur émérite à l'université de Sydney (School of Mathematics and Statistics) – est réputé pour ses contributions en probabilités et statistiques dont certaines ont débouché sur des applications aux domaines de la finance. Membre de l'Australian Academy of Sciences depuis 1985, il a aussi beaucoup contribué à l'histoire des probabilités et statistiques; il revient dans cet entretien sur ses collaborations avec François Jongmans ainsi qu'avec Henri Breny, Bernard Bru et Karen Hunger Parshall. Il nous montre ainsi que les articles cosignés avant d'être des traces écrites sont avant tout des histoires de rencontres humaines.

When and how do you meet François Jongmans?

The initial contact and further collaboration centered on the figure of the French mathematical the statistician Irenée-Jules Bienaymé (1796-1878), IJB in the sequel. After publication of the book of Heyde and Seneta [1977], I eventually traced a descendant, Alain Bienaymé, a professor of Economics at Paris IX Dauphine, who in a letter of February 2, 1981, mentioned the possibility of existence in the Bienaymé family of some documents of IJB. The next epoch was a paper by Butzer and Jongmans [1989] about P.L. Chebyshev (1821-1894) and his contacts with Western European scientists. IJB had been one such contact. The authors had seen and cited Heyde and Seneta [1977]. François Jongmans' address on that paper is given as the Université de Liège. Paul Butzer, a professor at the nearby Hochschule in Aachen had sent me the offprint. I wrote on July 13, 1989, to thank Butzer, and mentioned the possibility of the family documents, and suggested joint publication if he or François were able to follow this up with a trip to Paris. Butzer replied politely that François, having more time since he was now retired, might be interested in IJB. And indeed he was, not least because of IJB's strong Belgian connections.

François' first letter to me, in clearly handwritten English as were all the subsequent letters, is dated

August 1st, 1989, and advises that he has been retired for 3 years, and that he is busy working on what was to become the book on Catalan: Jongmans [1996]. But also says that he would be willing to go to Paris for a few days to investigate and make photocopies, if I had some means of making the trip financially neutral for him. In the meantime he would send me copies of 3 letters, of 1876, 77 and 78, from IJB to Catalan. The 3 letters were photocopies of the originals, accompanied (at my request) by typed versions (since IJB's handwriting was terrible due to his trembling hands). The letters of 1876 and 1877 would contribute to both aspects of Jongmans and Seneta [1993]. On my visit to the Jongmans family, François gave me a handwritten translation into English of the long letter of 1878, which played a central role in our later joint paper: Jongmans and Seneta [1994].

François denied that he was anything of a probabilist or statistician, which was the general technical area in which we collaborated, but he was firmly focussed on the historical role of Belgian mathematicians of French culture. IJB could be considered as such, having spent a part of his childhood and youth in Bruges, the birthplace of Eugène Charles Catalan (1814-1894). IJB's friend and contemporary leading Belgian statistician, the great L.A.J. Quetelet (1796-1874) was born the same year. It was not long before I had as enclosures with a letter from François of March 24, 1990, typed copies of letters from IJB to Quetelet, in particular recalling nostalgically his Bruges years (1803-1811). Then in a letter dated 21st Sept., 1990, François gave me the good news that his contact, Germain Bonte, a retired officer with archival training, and with the Bruges archives as a hobby, had provided him with much information about members of the Bienaymé family.

In a letter of March 15, 1990, I had written to François that I had made initial contact with Bernard Bru, whose main historical interest at the time was A. A. Cournot (1801-1877), a close friend of IJB. Bernard had recently discovered, amongst the Cournot materials, the essence of the lost proof of IJB of the criticality theorem of branching processes. Bernard was to become a good friend and valuable contact, but was too overloaded with work at the time to look for Bienaymé archival family materials. Because of this, François had consequently agreed to go to Paris in early December, 1990. A long letter of 8 closely handwritten pages of December 7th, 1990, from François contained a detailed account of his investigations in Paris, much detail from official archives on the Bienaymé family history, including photocopies of certificates of birth, death, and marriage of various family members.

There had been correspondence between IJB and A. Meyer (1803-1857), of which we learned from

Henri Breny (1923-1991), a friend and colleague of François at the Université de Liège. Breny's interest in the history of the course on probabilities at the Université de Liège, whose teachers included Meyer, Catalan, and Breny himself, led to the work: Breny [1992]. Henri and I had been exchanging letters sporadically for many years before meeting at a conference in Maastricht in August, 1985; and more intensively during the debilitating illness which took Henri's life, on January 5th, 1991. François and I completed the historical work on Meyer's role, in the context of his quarrel with Schaar, and contact with IJB, on the turning point test for randomness, and it was published as Breny, Jongmans and Seneta [1992], immediately following Breny [1992]. We also wrote an obituary: Jongmans and Seneta [1992]. On my first visit to Liège not long after, we visited Henri's grave, and his family. His final philosophical notes on the confluence of streams of probabilistic thinking, stimulated by, but divergent from, the book of Lorraine Daston [1988], sadly, remain incomplete in his letters to me.

Our source materials on the Bienaymé family history and IJB's contact with Belgian mathematics were thus almost completed. We prepared a joint note on IJB combining what we had at the time. Dedicated to Henri Breny, submitted in September, 1991 and published as Bru, Jongmans and Seneta [1992], it was a condensation of Bru [1991] and a forerunner of the comprehensive Jongmans and Seneta [1993].

The notes on Catalan's “un nouveau principe” for probabilities in Breny [1992] and François' special interest in Catalan helped motivate us to take up studies focussed on Catalan's probabilistic work, published as Jongmans and Seneta [1994]. Germain Bonte's information later stimulated a paper on history [Jongmans and Seneta 2000] on Bruges as a nursery of mathematicians.

In your article written with F. Jongmans: "A probabilistic "New principle" of the 19th Century [Jongmans & Seneta 1994], you study the idea of martingale. What are Catalan's contribution in this area?

Suppose urn A initially contains X_0 white balls and $N_0 - X_0$ black balls, with $N_0 (\geq 1)$, X_0 known and constant. Suppose N_1 balls are drawn out in succession (without replacement) from urn A and placed into previously empty urn B. Denote by X_1 the number of white balls which urn B now contains. The key assumption in Catalan [1877] is that both N_1 and X_1 are not known: that is, they are random variables. By assuming that N1 has a uniform distribution on $\{1,2,\ldots, N_0\}$ (using the Principle of Insufficient Reason to express ignorance), Catalan [1877] proves that

$$p_B = \frac{X_0}{N_0} \tag{1}$$

where P_B is the probability of now drawing a white ball from urn B. Bienaymé's letter of April 5th, 1878, indicates that the distribution of N_1 may be specified arbitrarily on $\{1,2,\ldots, N_0\}$. Here is a compact argument at the heart of this result. Given N_1, X_1 has hypergeometric distribution with mean:

$$E(X_1 \mid N_1) = N_1 \frac{X_0}{N_0} \tag{2}$$

so that

$$E(\frac{X_1}{N_1} \mid N_1) = \frac{X_0}{N_0} \tag{3}$$

Now taking expectation over, we obtain

$$E(\frac{X_1}{N_1}) = \frac{X_0}{N_0} \tag{4}$$

which, if we allow N_0, X_0 to be random, we can write as a conditional expectation:

$$E(\frac{X_1}{N_1} \mid (N_0, X_0)) = \frac{X_0}{N_0} \tag{5}$$

(5) is a general expression of (1).

The process of ball extraction could be continued indefinitely starting from urn B to urns C, D, E, …, and eventually (see Jongmans and Seneta [1994] for specifics), we may write:

$$E(\frac{X_i}{N_i} \mid (N_{i-1}, X_{i-1}),(N_{i-2}, X_{i-2}),\ldots,(N_0, X_0)) = \frac{X_{i-1}}{N_{i-1}} \qquad 1 \leq i \tag{6}$$

so that the sequence $\{N_n/N_n\}$ is a martingale. Thus the first step, (5), which we may attribute to Catalan [1877] is an early contribution to the concept of martingale.

With Karen Hunger Parshall [[Parshall]] and François Jongmans, you study the contributions of some actors (Sylvester, Crofton, Berbier and Bertrand) in Geometric Probability [Seneta, Parsahall & Jongmans 2001]. What is Geometric Probability and is it right that Catalan doesn't play any part in this field?

"Geometric probability" is the study of probabilities of geometric quantities such as a length or an area. The topic began in 1777, with what is now called "the Buffon needle problem." Buffon asked, in effect: if one drops a needle of length l "at random" onto a set of parallel lines which are all a distance d apart, where $d > l$, what is the probability that the needle intersects one of the parallel lines? Under uniform distribution assumptions on certain statistically independent random variables to define "at random", the probability sought is the probability measure of an area in the two- dimensional plane.

Another famous problem in geometric probability, whose origin and solution go back to 1873, asks: if a rod of length *1* (one) is broken into n pieces at *n-1* randomly chosen points, what is the probability that exactly *k* segments are of length greater than *x*, where $k=0,1,2,...,n$, and $kx \leq 1$. Catalan had contact with geometric probability in the context of this problem of the broken rod.

This was through his very energetic correspondent located at the University of Ghent, Paul Mansion (1844-1919), and then in connection with the probabilistic work of Ernesto Cesàro (1859-1906), who had been Catalan's student in Liège around 1879. In 1874 Catalan, Mansion, and Joseph Neuberg founded the journal *Nouvelle Correspondance mathématique* [Voir contribution de Pauline Romera-Lebret: chapitre 2], which continued till 1880. Then Catalan encouraged Mansion and Neuberg to publish a new journal, *Mathesis*, which appeared from 1881. Mansion published a great deal in both journals. Comments on the French history of the treatment of the broken rod problem in 1878 by Mansion (as author) and Catalan (as editor) in an article the *Nouvelle correspondance* elicited a letter, published in 1879, to the editor from one Lemoine. This letter attracted the attention of Cesàro, who, under the guidance of Catalan published on the broken rod problem in the *Nouvelle correspondance* in 1880; and then in 1882, 1883 and 1886 in *Mathesis*, with Mansion as editor, and with Lemoine unjustly dismissing the upstart novice Cesàro. The paper of Seneta and Jongmans [2005], accessible by title on the internet, gives a detailed account of the saga, and of Cesàro's achievement. Catalan does not figure at all in the British/French history of geometric probability portrayed in Seneta, Parshall and Jongmans [2001] (SPJ in the sequel).

You wrote several article (See bibliography) with F. Jongmans; can you explain to us your practice of writings?

Our contact, apart from three meetings, was by handwritten letters, of which each of us kept copies.

François wrote in excellent English, and was quick to respond. Using the facilities of the excellent libraries in Liège and Brussels, and with the help of M. Germain Bonte, he was able to send me progressively photocopies of the historical French-language materials which we compiled as needed for the project then being undertaken. His very large contribution to our joint work was on historical aspects, with especial attention to Belgium, and Catalan and Liège as focus. My historical motivation in our collaboration had initially been, more specifically, Bienaymé.

My main contribution throughout was synthesizing and presenting succinctly the technical probabilistic aspects, which occupy significant portions of Jongmans and Seneta [1993, 1994], SPJ, and Seneta & Jongmans [2005].

François, of course, wrote our three French-language papers, with only small contribution on my part to the content, and their final typed versions were produced in Liège. The first drafts of the historical sections of all our English-language papers except SPJ, were written by hand by François.

I collated everything into a coherent whole, which after several iterations was typed by a mathematically-skilled secretary at the School of Mathematics and Statistics at the University of Sydney, Australia, my permanent location. In the case of SJP, the typing was done by a mathematically-skilled secretary at the Department of Mathematics at the University of Virginia, USA, where I had spent a number of somewhat separated semesters over two decades, teaching applied probability models, and doing research. My presence there around 2001 was partly due the well-known historian of mathematics, Karen Parshall.

The two papers in *Archive for History of Exact Sciences* were communicated to that journal by Bernard Bru. We all three met in Paris in 1996, at the Bienaymé symposium organized by Bernard. The reader may notice some sizeable gaps between the appearances of the papers where François and I figure as joint authors, although the correspondence on background work for them had no such gaps. My "Jongmans" archived box in my retirement office at Sydney University has 4 folders of correspondence, over consecutive blocks of years to about 1998, and folders in my office at home contain subsequent correspondence, till François was no longer able to write from his retirement home in France. The last letter I have from him is dated December 30th, 2010. His daughter Claire now gives me brief messages and news by email.

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Sitographie

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