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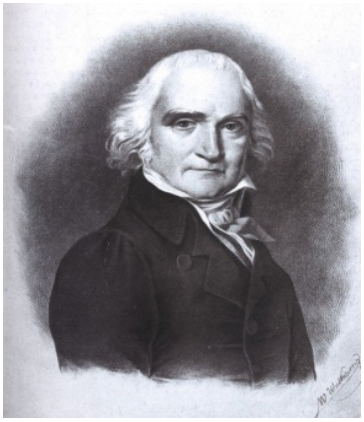
Jan Chrzciciel Władysław Śniadecki (1756–1830) – First Polish Probabilist[1]



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[1] Text not reviewed.

1. Biographical note

Jan Śniadecki was born on the 29th of August, 1756 in Żnin into a middle class background. Initially, he attended a renowned Lubomirski College in Poznan, and then continued his education, studying physics and mathematics, at the Jagiellonian University in Cracow. In 1775 he was conferred a degree of Doctor of Philosophy. In the years 1775–1778 he worked as a teacher in the so called New Manor Schools. In 1779 he went abroad to take up studies, first in Gent and then in Leiden and Hague. In 1780 he went to Paris with the aim of developing contacts with eminent mathematicians who worked, inter alia, in the area of probability calculus.

After a one-year stay in Paris he returned to his homeland in 1781, where he was offered the title of Professor and a post as the Head of the Department of Higher Mathematics and Astronomy at the Jagiellonian University. At that time, Śniadecki was engaged in didactic work alongside his scientific and literary activities, which resulted in writing and publishing a number of papers in the field of mathematical sciences. Moreover, he became a founder and the first director (1792–1803) of the Astronomical Observatory in Cracow.

In 1806 he accepted the post of an astronomer in Vilnius, and in the years 1807–1815 he held a post of eminence – the Rector of the Vilnius University. He also became a corresponding member of the St. Petersburg Academy of Sciences, a member of the Warsaw and Cracow branches of the Friends of Science Society and an activist of the National Education Commission.

Jan Śniadecki died in Jaszuny on the 9th of November, 1930.

2. Output overview

In Poland Jan Śniadecki (1756–1830) is considered to be the pioneer of the probability calculus. Śniadecki was the proponent of empirical methods in science, and particularly the use of inductive reasoning in the process of reaching the truth. His fundamental works include: "On the origin of mathematical sciences, their meaning and influence on the general enlightenment" (1781), "The theory of algebraic calculus applied for curved lines" (1783) and "On chance calculus" (1817). Śniadecki made his name in the history of Polish science as an outstanding mathematician and a precursor of mathematical statistics. In his work "On chance calculus" he explained conditions necessary for the occurrence of regularities in mass statistical phenomena. The work constitutes a certain theoretical foundation for statistical inference but, first and foremost, for research conducted with the use of the representative method. Jan Śniadecki, predicted an enormous development of this theory when he wrote in his work "On chance calculus": "It was my intention to turn the attention of the Honorable Academy to the mathematical calculus,

which is an almost untouched and little known here, difficult but at the same time extremely important issue, i.e. chance calculus (calculus probabilities), also called 'hit and miss calculus'" ("Philosophical Studies", vol. I, Warsaw 1958). In a further part of the same study he pointed at some applications of 'chance calculus', (the name given to probability calculus) in "Calculation of human mortality" with the use of mortality tables compiled by an English astronomer Halley. However, the application of chance probability is much wider as it may be used by insurance companies, in lottery games, etc. The work "On chance calculus" gives grounds for Śniadecki to be included in the group of precursors and pioneers of mathematical statistics.

Part three of the paper presents the arguments for the use of probability calculus as they were put forward by Professor Jan Śniadecki in his own, unique style.

3. On chance calculus

If the probability of hitting is added to the probability of missing we get one. And as it is a certain fact that a thing can be either hit or missed, it follows that in this calculation one is the expression of certainty. The closer the probability of hitting gets to one, the closer the expected event is to certainty; and on the contrary – the further the probability is from one, the more uncertain the event is. From the above, it also follows that if we get the probability of hitting and subtract it from one, we get the probability of missing. This truth is important whenever we need to simplify long and complicated calculations.

In the early days of the science of probability, the most frequently asked questions dealt with various games, and the first published studies were almost entirely devoted to them.

First of all, it was understood that this science leads to and encourages people to play games, which stands in opposition to what results from it. If reason was an effective cure to all human passions and follies, then this science would be the most powerful weapon to restrain consuming passions for games of chance or hazard, which bring people, their homes and families to ruin, and societies to destruction and demoralization.

The second use of the calculus lies in calculating loss and profit, fear and hope in national lotteries. Greed is a harmful passion leading to numerous offences and crimes, so it is improper for any government caring for the high morals of its citizens to feed this passion; it is improper to levy taxes on a sin which is encouraged by the government itself; it is improper to swindle earnings and savings from the poorest and most numerous class of society, and lure it from the way of work and industry to the way of chance and uncertainty. Moreover, the government profit from the lottery is unjust and fraudulent because the reward is, as the calculus

shows, not in proportion to the danger of loss. The government, which does not take any risk of loss, appropriates a large part of the players' chances of winning.

The third use of the calculus lies in calculating human mortality. And this is where this important issue may find its solution: what is the chance, which we call the chance of life, that a man at the age of 30 is going to live the same number of years as another man of the same age? The foundation of this calculation was based on the so called mortality tables which were first compiled in 1693 by an English astronomer Halley. He put together the population, births and funerals of the people of Wroclaw – the city where registers showed several times that with more modesty and less extravagance people lived longer and more decent lives.

4. Voices on Śniadecki

On 14 December 1930, to commemorate the 100th anniversary of Jan Śniadecki's death Samuel Dickstein delivered a speech at Warsaw University where he said: „Poland takes pride in the names of her great sons: Staszics, Kołłątajs, Czackis and many other noble men who put their stamp on the issue of education in this eventful epoch at the turn of the 18th and the first decades of the 19th centuries. Jan Śniadecki yields to none of them in his eagerness to fight for the public cause as well as his strong character and outstanding qualities of the mind".

Few were the Polish scholars who could rival Jan Śniadecki in the field of mathematical sciences; exceptions might be Brudzewski and Copernicus in 15th and 16th centuries, or Brozek, Pudłowski, Hevelius and Kochański in the 17th century. In the first half of 18th century the light of science starts to fade and its former centre – the Main Crown School, better known as the Cracow Academy, falls into a kind of sleep from which, according to the words of Professor Brückner in "History of Polish Culture", it will be awoken by Kołłątaj and, I dare say, by Jan Śniadecki – a true companion and an advisor to Kołłątaj. If Kołłątaj was the heart of the reform of the Cracow Academy then Śniadecki was its brain".

The fundamental, and probably most important, work of Jan Śniadecki in the field of mathematics and physics, is "Geography or a mathematical-physical description of the Earth", which had three editions in the years: 1804, 1809 and 1918 and a Russian translation.

I can only mention here, much to my regret, the dissertation about Copernicus written by Jan Śniadecki as an assignment set by the Warsaw branch of the Friends of Science Society which was the first ever critical study on the work of the father of modern astronomy; his work on the French mathematician Joseph Louis de Lagrange, which is a concise monograph with some critical remarks on the widely discussed at the time principles of the differential calculus; his dissertations: On calculation reasoning, On the use of national language in mathe-

matics, On calculus of chance or probability calculus, On division of mathematical sciences. Even today, all these works still deserve to be read. It is also worth remembering that Śniadecki was one of the creators of Polish mathematical terminology and that terms that he introduced into mathematics and astronomy have remained in use up to the present day.

Ignacy Chrzanowski, in his work entitled "Jan Śniadecki – the nation's teacher" published in 1930 by the Polish Academy of Science in Cracow, gave an excellent portrait of Jan Śniadecki as a Great Pole, a pedagogue and an academic teacher.

Śniadecki was teaching Poland how she should conduct herself so that the country would not perish; he understood, as no other man in Poland did, that even though its patriotic spirit may be strong, the nation did not stand a chance of survival without intellectual culture or science in particular. And then, starting from his early twenties when Śniadecki became the first teacher of algebra in Poland at the Jagiellonian University, throughout his mature years, when his life was occupied with teaching duties in Cracow, Vilnius and scientific work both in Poland and abroad, until his death Śniadecki was a devoted builder of the Polish intellectual culture and Polish science. He was holding the banner of science so high that very few of his contemporaries could equal him. He was one of Poland's best teachers throughout history – not just because he was a born teacher and that teaching was one of his life necessities but also because his work was based on excellent knowledge of both the strengths and weaknesses of the Polish mind and national character, as well as understanding the cultural needs of the nation. For that reason, the true, undeniable greatness of Jan Śniadecki lies in his pedagogical activity.

An earnest and true patriot, Śniadecki was indeed; the plague of cosmopolitanism which was spread by freemasonry, so common in the era of enlightenment, was not poisoning Polish souls yet. Once, Napoleon asked Śniadecki, looking at the scholar with his keen eye, "Are you a patriot Monsieur Rector?" and Śniadecki replied, "From the cradle, Your Majesty, I learned how to love my country, and its misfortunes made me love it even more deeply". And that was true – Śniadecki loved Poland since his youth until his late years.

One day in 1771 when Śniadecki was staying in Paris he was approached by D'Alembert who offered him a scientific post in Madrid in agreement with the Spanish government. Later Śniadecki recalled "He described to me the uncertain fate awaiting this country sooner or later: I was deeply touched by D'Alembert's truly noble care and thoughtfulness but I was prompt to say that, being a Pole, I owe my services to my home country and I am ready to share my fate with the fate of Poland whatever it may be".

In 1807 at the age of 52 Śniadecki was already serving his term as the Rector of the Vilnius University. For a long time his heart was beating faster at the sight of the rich and charming widow Mrs Chołoniewska. Incidentally, the correspondence between the two sheds some interesting light on the problem of how the he-

art of a mathematician may harbor simultaneously a love for a woman and a love for higher mathematics. On one occasion Śniadecki reproached his beloved for the letter for which he had been waiting for 10 days, 13 hours, 25 minutes and 40 seconds. Mrs Chołoniewska, using her knowledge of another field, replied that her beloved man had a "calf's brain". And this "calf's brain" probably helped Śniadecki realise that due to the numerous and heavy duties imposed on him by the country, he was allowed to think neither about his personal happiness nor about starting a family. And he listened to the voice he heard not only in his head but also in his heart. One of the principles, which he learned from the culture of enlightenment, and which was deeply ingrained in his soul (as he once put it in one of his academic speeches), was that a citizen "who understands the right social order" should "measure his days against the background of the public benefit". It required a strong character and a deep love for his home country to repeat these words after Staszic: my happiness lies only in the things which bring happiness to my country.

5. Message

After the death of Adam Mickiewicz another great poet Zygmunt Krasiński said "We are all in his debt". May all principals of Polish schools, all Polish teachers and all Polish scholars follow in the footsteps of Śniadecki! May all those who love school, teaching and science not just for the love of school, teaching and science, but also for the love of their country have the right to say "We are all in his debt – in Jan Śniadecki's debt!".

References

Dickstein S. (1901), *Jan Śniadecki. Album biograficznie zasłużonych Polaków i Polek wieku XIX*, Marya Chełmońska, Warszawa.

Libelt K. (1866), *Dwaj bracia Śniadeccy*, Księgarnia Jana Konstantego Żupańskiego, Poznań.

Więsław W. (2015), *Pierwsza polska rozprawa z rachunku prawdopodobieństwa*, "Śląski Przegląd Statystyczny", vol. 13(19), pp. 251–281.

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