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Albert Châtelet (Valhuon, 1883 – Paris, 1960)
President 1952-1954

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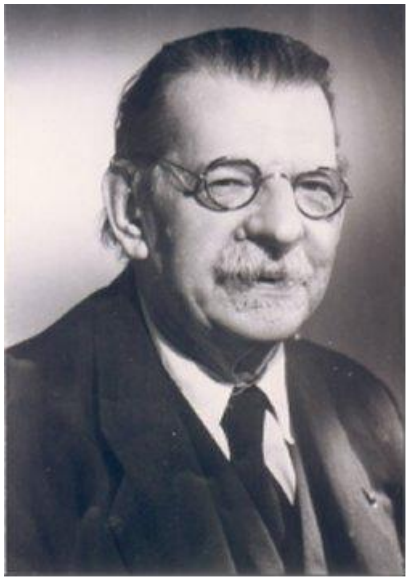

1 Short Biography

Albert Châtelet was born on October 24, 1883 in Valhuon, a village of 600 inhabitants in the north of France. His father, François Châtelet, was the local elementary school teacher; he also received prizes for farming courses and for his reports to local societies for the improvement of agriculture (Condette 2009, pp. 40-41). From the Valhuon school, Albert Châtelet went to the Saint-Pol secondary school, and then to the Douai *lycée*, where, thanks to a public grant, he prepared for the highly selective competitive examination for the *École normale supérieure* (ENS) in Paris, where he was accepted in 1904. After a year of military service, he followed the usual curriculum of the ENS, which culminated with a second place at the *Agrégation de mathématiques*, just behind Georges Valiron. During this period, he met Marguerite Brey, a friend of his sister and a student in mathematics: they were married in August 1909 and she would leave her own career to take care of their nine children (Condette 2009, pp. 96-101).

Scholarships from the Commercy Foundation then allowed Châtelet to prepare a thesis (initially supervised by Jules Tannery, the scientific director of the ENS), *Sur certains ensembles de tableaux et leur application à la théorie des nombres*, which he defended on April 27, 1911 (after Tannery's death) (Condette 2007). Châtelet also selected the same themes for the prestigious Foundation Peccot-funded lectures he was chosen to give at the *Collège de France* between April and June 1912 and that he published under the title *Leçons sur la théorie des nombres* (Châtelet 1913). In these first mathematical works, Châtelet studied continued frac-

tions and algebraic numbers in the arithmetical tradition created by Charles Hermite; he also systematized the number-theoretical use of matrices (then called *tableaux)* and used recent German developments in number theory, such as the theory of ideals and Hermann Minkowski's geometry of numbers - a rare case in the French mathematics of the time - obtaining in particular new explicit results for cubic fields (Gauthier 2020).

Just before and after his thesis, Châtelet was employed as a teacher in *classes préparatoires* (special classes preparing the competitive examinations for the ENS or the *Ecole polytechnique*) in Paris and then in Tours (Brasseur 2010). After these first experiences, he was charged with the lectures in rational and applied mechanics at the Faculty of Sciences and at the Electrotechnical Institute of Toulouse, in the south of France. He had just been given a position back in his home region, at the University of Lille, in 1914, when the First World War broke out (Condette 2007). Mobilised on August 2, 1914, in the health services of the army, he finally joined the *Commission d'expériences d'artillerie navale de Gâvre*[1] in April 1916. He worked there (like other mathematicians such as Jules Haag or Arnaud Denjoy) on a variety of ballistic questions, including "the loading, priming and efficiency of projectiles, … personally directing with great competency the preparation and execution of firings and experiments of all kinds,"[2] as is stated in the post-War testimony of satisfaction from the War Ministery, which also praised Châtelet for his "practical sense, a great clarity of judgment and a remarkable spirit of implementation" (quoted in Gauthier 2020).[3]

Châtelet finally took up his position in Lille in February 1919 (although he still acted for years as advisor for the Artillery Commission). From this moment, although he still published a few research articles on number theory and algebraic structures, his career took a new direction; he took on increasing administrative responsibilities, first as *Doyen de la faculté des sciences de Lille* (Dean of the Faculty of Sciences of Lille) from 1921 to June 1924 and then as *Recteur de l'académie de Lille*[4] until January 1937 (Châtelet 1953, Condette 2007, Gauthier 2020). The whole region, and in particular the University, had been severely affected by the War, and Châtelet was at the origin of many projects for its reconstruction during this period. Among these, we may mention the establishment of an institute of fluid mechanics, a laboratory of astronomy, an observatory, an institute of social sciences, the construction of a new medical faculty, housing and a restaurant for students, etc. (Condette 2009, Gauthier 2020).

In 1937, Châtelet was appointed Director of Secondary Education at the Ministry of Education—meaning that he was in charge of the organization of teaching in France from elementary school to high school—and launched, with the support of the Minister, Jean Zay, a modernization and democratization of the school system, unifying in particular the programs of the various school tracks. In 1940, he was fired by the Vichy Government and found himself for a time without a position, but the Faculty of Sciences of Paris decided to create a chair for higher arithmetic and proposed Châtelet as its candidate. Although this proposal was rejected by the Government and Châtelet was officially posted to another university, he nevertheless lectured on higher arithmetic in Paris. In 1945 this position became permanent: Châtelet was hired as associate professor in April, and then full professor in October, in the newly-created Chair of Arithmetic and Number Theory of the Faculty of Sciences of Paris; he would become *Doyen* (Dean) of the Faculty in 1949 until his retirement in 1954. He worked actively for the renovation of the University and its buildings. It was also during this period, from

[1] Commission for Experiments in Naval Artillery, near Lorient in Britanny.

[2] The original text is: "des questions de chargement, d'amorçage et d'efficacité des projectiles, …, dirigeant enfin personnellement avec une grande compétence la préparation et l'exécution de tirs et d'expériences de toutes sortes."

[3] The original text is: "sens pratique, une clarté de jugement et un esprit de réalisation remarquable".

[4] State Superintendant of Education for the Lille region.

1947 on, that Châtelet organized with Paul Dubreil a regular seminar on algebra and number theory which has lasted, under various organizers, until the present day. He also participated in the edition of Georges Halphen's and Henri Poincaré's complete works (Pérès 1960, Condette 2009).

Châtelet was very active at a high administrative and political level. From July 1945 to August 1946, he was director of the *Mouvements de jeunesse et de l'éducation populaire au Ministère de l'éducation nationale.* He wrote various reports for the Government about education, research and universities, and became vice-president of the *Commission de la recherche scientifique et technique*, in charge of planning a modernization and equipment program for theoretical and applied research. He was also engaged in the development of cultural relations with other countries: for example in December 1949 he was sent to establish cultural agreements with Vietnam, and later, during the Cold War period, he promoted scientific and cultural links with the Soviet Union, East Germany, and China, as a means to further international peace. He also belonged to several commissions of UNESCO; he chaired the International Commission for the Teaching of Mathematics from 1951 to 1954 and was the first President of the renovated ICMI. From 1955 on, he was also President of the *Union rationaliste*, an association created by Paul Langevin in the 1930s to promote rationality and science in public debate. The high point of Châtelet's political engagement was probably his participation in the *Union des Forces Démocratiques (Union of Democratic Forces),* a political party created in 1958 around personalities such as Alfred Kastler, Pierre Mendès-France, François Mitterrand and Laurent Schwartz; it was a left-wing, non-communist party, opposed to Charles De Gaulle's policy, in particular with respect to colonization. Châtelet, a militant against the Algerian War, accepted the candidacy of this party against De Gaulle (and the Communist Party candidate, Georges Marrane) in the French presidential election of 1958, obtaining 8,4% of the votes of the electoral college (Condette 2009, chapters 6 and 7).

Albert Châtelet died in Paris on June 30, 1960.

2 Contribution to Education

Châtelet expressed his interest in mathematical education as early as 1909 (the same year as his first number-theory papers), when he published a study of the principles of geometry and their impact on elementary teaching for a pedagogical journal. From then until his death, he maintained this interest; due to his various responsibilities, both at a local and a national level, Châtelet was able to renovate the French educational system, extensively planning new sites, facilities and buildings. As rector, he promoted and inaugurated in 1926 a pilot school in the northern town of Saint-Amand-les-Eaux. While the French system then sharply segregated after primary school (often on a financial and social basis) between the pupils going to the free, local, practically-oriented higher primary schools and those going to the longer curriculum of the fee-charging high schools, Saint-Amand’s new (and free) school offered a four-year common programme, with possible options and bridges, which partly inspired the reforms at a national level of the 1930s and later (Condette 2012). Châtelet also organized or participated in several conferences on education (Condette and Savoye 2011).

As for the ICMI, Châtelet's correspondence allows us a glimpse of the difficulties confronted by its first officials: to decide the conditions for admission and representation of new countries (when mathematical life in the 1950s could vary considerably from one country to another), to solve delicate issues of independence with respect to the different national mathematical societies and to the International Mathematical Union (particularly explicit on the occasion of the Amsterdam 1954 International Congress of Mathematicians and the subsequent administrative meeting of the IMU in The Hague), or simply to obtain recognition for pedagogical work. The exchanges between Heinrich Behnke, Marshall Stone and Châtelet

clearly display these issues. For instance, on August 26, 1954, an aerogramme from Stone to Châtelet stated:

> Account must be taken of the real difficulties that formally complicate relations between the [International Mathematical] Union, ICSU [International Council of Scientific Unions], the member organizations, the national commissions and the commissions, especially ICI, which in my opinion should enjoy the fullest possible autonomy. The trust and goodwill on which one can certainly rely within a scientific organization are not always effective substitutes for consultations on the means to achieve the intended ends.[5] (Fonds Albert Châtelet, 81J 21, Archives départementales du Pas-de-Calais, Arras, France).

During the same month, Heinrich Behnke wrote to Châtelet:

> It is a very difficult matter to engage mathematicians, well-known for their research work, into problems of instruction. Most of our colleagues refuse to be active for our commission because they regard this kind of work of little value, and then even neglect to forward circulars. Twice I have sent out a letter asking to set up sub-commissions and to designate delegates, to all adhering national organizations, using a list with addressees which I had received from Prof. Bompiani. There were only a few answers. … It was not so easy to convince the organization committee in Amsterdam of the value of our efforts.[6] (Fonds Albert Châtelet, 81J 21, Archives départementales du Pas-de-Calais, Arras, France).

The journal *L'Enseignement Mathématique*, which had become the official journal of the ICMI, also suffered from various problems (in particular financial) and Châtelet accepted its direction after Behnke had replaced him as president of the ICMI.

Châtelet was also active at a pedagogical level. He developed new university courses, for instance on vector calculus (Châtelet and Kampé de Feriet 1924) or on algebra (Châtelet 1954-1966). More unusually, he collaborated with publishers to develop various series of schoolbooks. Following a change in the French programme for the teaching of arithmetic at an elementary level, he directed for the publishers Eugène Chimènes and Michel Bourrelier a series of books for nursery and primary schools, written together with school teachers and with the elementary school inspector Georges Condevaux (with whom he had already collaborated in the Saint-Amand project), and which went through numerous editions (Radtka 2017). Châtelet also launched a collection of scientific textbooks for secondary teaching with the publisher Albert Baillière (including his own *Géométrie et algèbre*, written in 1935 with Roger Ferrieu, and an *Arithmétique* in 1943). His involvement went from choosing the authors to writing or supervising in detail the contents to discussing how to introduce mathematical concepts more efficiently and more naturally to proofreading and commenting on illustrations and layouts (Radtka 2018).

Like Jean Zay, but also like the psychologist Jean Piaget with whom he collaborated, Châtelet favored an active and inductive pedagogy, developing the critical and reflexive minds of the pupils. One of his arithmetic books for ten-year-olds (Condevaux and Châtelet 1949) has the title: "I Learn to reason."[7] "The various textbooks should be linked by their very

[5] The original text is : "Il faut tenir compte des difficultés réelles qui compliquent d'une façon formelle les relations entre l'Union, l'ICSU, les organisations adhérentes, les commissions nationales et les commissions, surtout l'ICI qui à mon avis doit jouir d'une autonomie aussi complète que possible. La confiance et la bonne volonté sur lesquelles on peut certainement compter au sein d'une organisation scientifique, ne sont pas toujours des substituts effectifs pour les consultations relatives aux moyens aptes à arriver aux fins envisagées."

[6] The letter is in English. Behnke sent an identical letter to Stone (Behnke to Stone, Oberwolfach, August 11, 1954, in *IA*, 14A, 1952-1954).

[7] The original text is: "J'apprends à raisonner."

content," Châtelet wrote, and for this "it suffices to accept the need for a humanist learning. e.g. in physics, not to be satisfied with mere technical study, but to also present the problems with their philosophical, historical, etc., aspects" (Fonds Albert Châtelet, 81J 45, Archives départementales du Pas-de-Calais, Arras, France, quoted in Radtka 2018, p. 155).[8]

Methods should be based on concrete manipulation of material objects, or on personal observation, and teachers should encourage collaboration among pupils, as well as among themselves. The issue was "simplifying and invigorating, teaching arithmetic by appearance and by action" (Radtka 2017, p. 184).[9] Châtelet's books for elementary classes thus promoted the use of dominos, sticks, and marbles, and his correspondence with his publisher shows him discussing details of color illustrations of hens and farmers, as well as whether or not one can legitimately write a product such as "100 m × 100 m" in a chapter on areas. Châtelet however insisted above all on a non-dogmatic approach, as in his own research, a "renovation without a revolution" (Radtka 2017, p. 177).[10] In an address to the Congress of Childhood in 1931 on number learning, he concluded:

> The good method, the true method, the unique method, is the one [the schoolteacher] knows how to handle and to apply. The best way of teaching is that which each teacher practices in her class, provided that she does so confidently and joyfully.[11] (Châtelet 1932, preface).

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[8] The original text is: "Il faut donc que les divers ouvrages soient liés par leur substance même. Il suffit d'admettre la nécessité d'une étude humanisante. Ex. en physique ne pas se contenter d'une étude technique mais présenter les problèmes sous leur jour historique, philosophique, etc."

[9] The original text is: "Simplifier et vivifier, enseigner le calcul par l'aspect et par l'action."

[10] The original text is: "Renouveler sans révolutionner."

[11] The original text is: "La bonne méthode, la vraie méthode, l'unique méthode, est celle que chacune d'elles sait manier et appliquer. La meilleure façon d'enseigner est celle que chacune d'elles pratique dans sa classe, à condition qu'elle le fasse avec confiance et avec joie."

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