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Isabelle Lémonon

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Madame de Chastenay: Reading and Writing Practices in Elementary Mathematics in France after the Révolution - Isabelle Lémonon Waxin (EHES- Centre Alexandre Koyré, Paris, France)
ilemonon@gmail.com

Abstract : Victorine de Chastenay (1771-1855) is well-known by the historians of the French Empire, Consulat and Restauration's periods through her Memoirs, a direct testimony of the French court life and the many policy mutations occurring after the Révolution. She is also recognized as an author through her french translation of *The mysteries of Udolfo* by Ann Radcliff in 1797, and several publications on history and literature. But this “heir of the Enlightenment” also invested sciences as astronomy, botany, physics, mathematics...She wrote thousands of manuscript pages through 50 years of sciences's studies. This talk aims at describing her reading and writing practices in elementary mathematics (mostly geometry of triangles) by analyzing her manuscripts. Some of those are reading records and others form personal geometry lessons. Through this study, we have a privileged insight into the ways some women (and men) could study mathematics from the Révolution to the Restauration in France, when excluded from the University or the Grandes écoles (Polytechnique, École centrale, École normale...).

I usually focus on scientific practices by women during 18th century in France, to better understand the roles and practices of these « invisible technicians », as Shapin put it, and to have an accurate view of what a female « geometer or astronomer » means in the words of Enlightenment's well-known savants. It also involves to highligh social and gender factors that influence their path in science's production. Yet, today, I am having a step in « terra incognita », (« tempus incognitus »??) that is, the first half of 19th century. I present the first results of a recent work in progress, triggered by the discovery of many manuscripts by Victorine de Chastenay, dealing with both social and hard sciences, between 1797 and 1854.

First of all, a quick view on what is known about french women's practices in mathematical sciences from 1700 to 1850, in France. About 18th century, the only testimonies are from indirect primary sources about female calculators in astronomy (while we have direct sources from male calculators)

and from the numerous manuscripts by Emilie Du Châtelet (first half of the century). The only case studied by historians of science for the first half of the 19th century is Sophie Germain (« Monster »), who dealt with number theory and elastic surfaces (only other woman in England Ada Lovelace with Babbage). Today, I propose a new case of mathematical practices performed by an unknown woman in science, which might be more representative of the probable female involvement of this period.

Who is this woman ? Victorine de Chastenay was raised in an ancient noble family, and alike Emilie du Châtelet, she benefited from an exceptional education during childhood. Her brother and her, had many private tutors teaching them the classical backgrounds (grammar, latin, music, history) and the less common ones for a girl (mathematics, botany, physics...). Their father was very curious about sciences, and he himself took classes with Fourcroy, Desfontaines...and many savants who were regularly invited to his salon ; The children were allowed to talk with them. To insure the freedom of their daughter, her parents got her the title of « chanoinesse », that is a position in church that secured her a social position (title= Madame), a pension and no obligation to get married (very important at that period to allow a woman to choose her own dedication to something). Despite the Révolution, she was able to maintain her position and started to publish (translation of Mysteries of Udolfo by Ann Radcliff, history...).

She became very close to Napoleon's 1st wife and developed a very important political (Fouché, Talleyran...) and scientific (Arago, Cuvier, Desfontaines...) network, which lasted until her death. She intensely dedicated herself to scientific activities between 1800 and 1820.

The first glimpse to her manuscripts, and the reading of her Mémoires published posthumously, demonstrate a systematic practice of Note-taking, initiated by her father when she was a child. Unfortunately, her childhood manuscripts were destroyed, and the only part remaining covers the period 1795-1854. Whatever the topic, Victorine de Chastenay used to write books and journals abstracts containing the main ideas, the ones she was interested in, some commentaries, comparisons with other authors, and critics (and she was reading a lot !!). She also noted her everyday life to keep a testimony for history (which became her Mémoires), many notebooks of botany experiments, an important amount of notes of the sciences's classes she attended (like Cuvier's, Arago's, Hassenfratz...), and she wrote a few personal dissertations (botany, geometry). Her archives attest also of notes exchanging with other savants or amateurs. These kinds of practices were very common in 18th/ beginning of 19th centuries, both amongst male savants or « amateurs », and this study confirms them not to be gendered. Victorine applied the practices taught by her male tutors and her father while being a child (18th c). She also describes in her Mémoires, an oral practice she used very

commonly. She was convinced that to write correctly any statement, it had to be understandable while exposed orally, without any support. These practices were applied to mathematics, and will explain the way she wrote her geometry.

What kind of mathematics was she dealing with ? From her manuscripts (diapo), it is clear that she only mastered elementary mathematics, even if she was interested in what was called at this period transcendental mathematics (differential calculus, infinitesimal analysis...). She clearly understood the necessity to deal with this kind of mathematics to understand physics, astronomy and mathematics, as she wrote in several occasions in her *Mémoires* and manuscripts (diapo).

The remaining sources are made of a « géométrie raisonnée » for herself, a short note about exponential, function and differential, abstracts of her readings of the maths classes of Laplace and Legendre in Ecole Normale in 1795, Montucla's *history of mathematics* and Laplace's *Philosophical essay on probabilities*, and a note (not by her hand) about conics.

About Montucla's book, Victorine de Chastenay points at its characteristics comparing it to other author's books (Bailly, Condillac), but furthermore she highlights her way of writing mathematics : using a philosophical style, the language of reasoning...

...as she did in her *géométrie raisonnée*, which presents elementary geometry (lines, surfaces, volumes, triangles, polygons, spheres, cylinder...), excluding calculus and schema. This text of 30 pages was clearly prepared by many readings but also written following its author's reflexion, as shown by the many erasures, and additions. The author structured her discourse as a story, including the definitions and demonstrations, a very common organisation of scientific classes in 18th c. She wrote this way by choice as she explained :

« "I have always believed that one could treat geometry in a philosophical order and that mathematical truths could all be offered to the mind by a series of abstract propositions and a rigorous correctness »
- Her practice of writing mathematics is clearly inherited from her 18th c science's tutors.

These several practices I talked about, were performed in a domestic space (as she could not have any institutional position and office) and that was also the case of many male savants (need of a personal space). She usually wrote back home after her social obligations, often at night, using the readings she had in the imperial/national library or in private libraries like De Sacy's one. We may wonder why she wrote thousands pages of manuscripts in social and hard sciences. Victorine gave us

some hints in her motivation : she had a passion for study, because that was for her a way to access freedom and glory. But why writing in mathematics ? Because she was dazzled by the power of their rigor to explain the world. But one question remains : why did she not publish anything of her hard sciences manuscripts (except from her botany, in a poetic way) ?

I will give a few tracks about that in my conclusion. Her rare example of mathematical practices by a woman in the beginning of 19th points also at her limits to take part to science production during this period of changes, where scientific disciplines emerged :

- First, she inherited her practices from Enlightenment tutors (who taught in childhood in a philosophical way), using a universalism vision of knowledge.
- Second, as a woman, she could not easily reach access to « High mathematics », and was aware of the necessity to specialize to be able to do so,
- Finally, she clearly knew the social disapproval of publishing in science as a woman in 19th century.

A small sketch that could explain why we are only 30 % of this audience to be women, and not 50 % as it should be !