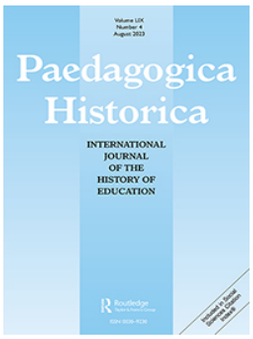

Routledge
Taylor & Francis Group

Paedagogica Historica

International Journal of the History of Education

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/cpdh20

Exceptional women in science education? Émilie Du Châtelet and Maria Gaetana Agnesi

Maria Tamboukou

To cite this article: Maria Tamboukou (2023): Exceptional women in science education? Émilie Du Châtelet and Maria Gaetana Agnesi, Paedagogica Historica, DOI: 10.1080/00309230.2023.2238621

To link to this article: https://doi.org/10.1080/00309230.2023.2238621

Published online: 31 Jul 2023.

PAEDAGOGICA HISTORICA
https://doi.org/10.1080/00309230.2023.2238621

Routledge
Taylor & Francis Group

Exceptional women in science education? Émilie Du Châtelet and Maria Gaetana Agnesi

Maria Tamboukou

Leverhulme Major Research Fellow, University of East London, London, UK

ABSTRACT

In this paper the author considers the educational experiences and ideas of Émilie Du Châtelet and Maria Gaetana Agnesi, two women mathematicians, scientists and philosophers in eighteenth-century Europe. By tracing their historical emergence as subjects of scientific knowledge, as well as creators of philosophy and culture, the author argues that we need to revisit the history of women's science education and deconstruct the image of "the exceptional woman". In doing so the author proposes the notion of the *event* as a useful theoretical lens through which we can understand women's historical constitution as mathematicians, philosophers and scientists.

ARTICLE HISTORY
Received 3 January 2023
Accepted 15 July 2023

KEYWORDS
Exceptionality; *event*; mathematics; science education; women

> Since I began to live with myself, and to pay attention to the price of time, to the brevity of life, to the uselessness of the things one spends one's time with in the world, I have wondered at my former behaviour: at taking extreme care of my teeth, of my hair and at neglecting my mind and my understanding. I have observed that the mind rusts more easily than iron, and that it is even more difficult to restore to its first polish.[1]

In the very first paragraph of her preface to Bernard Mandeville's translation of *The Fable of the Bees*,[2] Émilie Du Châtelet (1706–1749) deplores the fact that she had let her mind rust for the sake of looking after insignificant things in life, like her hair and her teeth. And yet, Du Châtelet was an unusually well-educated woman in eighteenth-century France, a philosopher, physicist and mathematician, whose contribution to the history of philosophy and science has been the focus of a growing body of literature and scholarly work.[3] Du Châtelet started work on this translation in 1735, when she was twenty-eight years old and in a critically transitory period in her life, as I will discuss later in the paper. Her disillusionment with her mental abilities should therefore been seen in the context of an intellectual awakening after a period of fulfilling her duties as a dutiful daughter of the aristocracy.

CONTACT Maria Tamboukou m.tamboukou@uel.ac.uk Leverhulme Major Research Fellow, University of East London, 4-6 University Way, London E16 2RD, UK

[1]Émilie Du Châtelet, *Selected Philosophical and Scientific Writings*, ed. Judith Zinsser, trans. Isabelle Bour (Chicago: The University of Chicago Press, 2009), 44.

[2]Bernard Mandeville, *The Fable of the Bees: Or, Private Vices, Public Benefits. With an Essay on Charity and Charity-Schools. And a Search into the Nature of Society*, 3rd ed. (London: J. Tonson, 1724).

[3]See amongst others in the Anglophone literature: Ruth Hagengruber, ed., *Époque Émilienne: Philosophy and Science in the Age of Émilie Du Châtelet (1706–1749)*, vol. 11 (Springer Nature, 2022); Katherine Brading, *Émilie Du Châtelet and the Foundations of Physical Science* (New York: Routledge, 2019); and Ruth Hagengruber, ed., *Émilie Du Châtelet Between Leibniz and Newton* (Dordrecht: Springer, 2012).

Far away from the Château de Cirey – where Du Châtelet lived and worked between 1735 and 1739, in the company of the famous poet and philosopher Voltaire – a young woman in Milan was also in the process of serious scientific work. Maria Gaetana Agnesi (1718–1799) was finishing the manuscript of her *Propositiones Philosophicae*, a series of essays on natural philosophy and history, which was published in 1738. Well before this publication, Agnesi had passionately defended women's right to education in a public *oration* written by her Latin tutor Gemelli, when she was only nine years old: "I consider it worthwhile today to reveal to my illustrious listeners, no matter how many surround me, how contrary to the truth is the opinion of those who suppose that the studies of the liberal arts are judged unsuitable in women".[4]

Taking Du Châtelet's and Agnesi's reflections on the value of education as my starting point, in this paper I focus on two women mathematicians, scientists and philosophers in eighteenth-century Europe, exploring their own educational experiences, as well as their ideas and writings about women's education. The paper emerges from a wider Leverhulme-funded project of writing a feminist genealogy of "automathographies", a term Paul Halmos has used to narrate the life process of becoming a mathematician.[5] By tracing women mathematicians' historical emergence as subjects of scientific knowledge, as well as creators of philosophy and culture, what I argue is that we need to revisit the history of women's science education and deconstruct the image of "the exceptional woman", using instead the notion of the *event*, as a theoretical lens for making sense of their becomings. This is an important step if we are to think differently about the problem that well into the twenty-first century women are still in the margins of mathematical sciences, either as students, teachers, researchers or academics.[6]

Here it is important to note that although there is a growing body of literature around Du Châtelet and Agnesi, their "automathographies" have not been studied in their interrelation, with the exception of a graduate study in German.[7] Du Châtelet and Agnesi are the only published women mathematicians (that we know of) who worked during the eighteenth century. They were seriously engaged with the scientific debates of their time, and particularly so with the Cartesian, Newtonian and Leibnizian ideas, prevalent in the European scientific circles and networks.[8] They certainly knew of each other, although there is no evidence that they ever met or communicated via correspondence. Du Châtelet's much celebrated book, *Institutions de Physique*, first published in 1740, with its second edition translated in Italian in 1743 as *Institutioni di fisica*, was in

[4]Maria Gaetana Agnesi, "The Studies of the Liberal Arts by the Female Sex Are by No Means Inappropriate (1727)," in *The Contest for Knowledge*, ed. and trans. Rebecca Messbarger and Paula Findlen (Chicago: The University of Chicago Press, 2005), 117–40, 130.

[5]Paul Halmos, *I Want to Become a Mathematician: An Automathography* (New York: Springer, 1985).

[6]For more details about this project, see https://sites.google.com/view/numbersandnarratives/a-feminist-genealogy-of-automathographies (accessed 16 July 2023).

[7]Carlotta Martini, *Zwei Frauenleben für die Wissenschaft im 18. Jahrhundert: Eine vergleichende Fallstudie zu Émilie Du Châtelet und Maria Gaetana Agnesi* [Two Women's Lives for Eighteenth-Century Science: A Comparative Case Study of Émilie Du Châtelet and Maria Gaetana Agnesi], Bearbeitet und herausgegeben von Gudrun Wolfschmidt (Hamburg: tredition Nuncius Hamburgensis; Band 43, 2017).

[8]Du Châtelet and Agnesi began their scientific career in a time marked by controversies, whose origins date back to the seventeenth century, and marked by Copernicus's new astronomy, René Descartes's mechanically functioning universe and Isaak Newton's mathematical laws of universal attraction. In the first half of the eighteenth century, the time of the scientific works of Du Châtelet and Agnesi, the debates were on the fundamentals of physics, which went back to the incompatible basic models of the founding fathers Descartes, Newton and Leibniz. See, amongst others, John Bennett Shank, *The Newton Wars and the Beginning of the French Enlightenement* (Chicago: Chicago University Press, 2008) for an elaboration on these debates and controversies.

the Palazzo Agnesi library in Milan.[9] In commenting on the French Academy of Sciences' refusal to accept women as members, Du Châtelet had written: "I myself know that if the laws of the Academy had permitted the admission of Ladies, this would have been achieved by Mademoiselle Agnesi".[10]

As has now been established, science education has histories as well as geographies, and scholars in the field have been investigating how scientific knowledge is created and circulated in specific times, places and cultures.[11] Thus, by focusing on two women who lived in eighteenth-century Europe, but engaged with philosophy, science, and mathematics within different geographical, social, political and cultural contexts, the paper points to the importance of analysing nuances, differences and erupting *events* in the complex histories of gender, education and science. Following Ruth Watts, who has pointed to "the cultural roots of [...] gendered imbalance in participation in fields of knowledge",[12] it is precisely the minutiae and differences of cultural roots that the consideration of two women mathematicians and scientists in their interrelation will bring forward.

In this context the paper unfolds in five parts. After this introduction I give an outline of the genealogical approach of this paper, as the theoretical backdrop for the notion of the *event*, which illuminates the analysis of the paper, and then I look at discourses around women's education particularly focussing on the eighteenth century, the time in which both women lived and worked. In the next two sections I examine Du Châtelet's lived experiences, as well as ideas about education, as expressed in her publications, before turning to Agnesi's *oration*, delivered in 1727 and published in 1729, as well as the prefaces of her published works. Finally, in the conclusion I examine the discourse of "the exceptional woman" by counterposing the notion of the *event* as a lens to make sense of the two women mathematicians' life and work.

Thinking genealogically: in the archive of the debates around women's education

As a theoretical and methodological approach, genealogy in Michel Foucault's philosophical work investigates the processes, procedures and apparatuses whereby truth and knowledge are produced.[13] Genealogy writes the history of the present: it problematises the multiple, complex and non-linear configurations of the socio-political and cultural formations of modernity. In the context of a feminist genealogy of automathographies: what were the conditions of possibility for women to be excluded from the world of mathematical sciences, how were they historically constituted as subjects of scientific knowledge and why are they still in the margins of this discipline? Genealogy as a method of analysis looks into the archive to excavate forgotten stories and documents which might throw light in the practices and discourses that have excluded and marginalised

[9]See Massimo Mazzotti, *The World of Maria Gaetana Agnesi, Mathematician of God* (Baltimore: Johns Hopkins University Press, 2007), 102.
[10]Cited in Cornelia Benazzoli, *Maria Gaetana Agnesi* (Milan: Fratelli Bocca, 1939), 107.
[11]See David N. Livingstone, *Putting Science in its Place: Geographies of Scientific Knowledge* (Chicago: The University of Chicago Press, 2005).
[12]Ruth Watts, *Women in Science: A Social and Cultural History* (London: Routledge, 2007), 1.
[13]Michel Foucault, "Nietzsche, Genealogy, History," in *The Foucault Reader*, ed. Paul Rabinow (Harmondsworth: Peregrine, 1986), 76–100.

women from the field of mathematical sciences. But instead of seeing history as a continuous development of an ideal schema, genealogy searches in the maze of dispersed events to trace discontinuities, but also unexpected continuities. Women's ambivalent position in the world of modern science is a paradigmatic case of uneven historical developments, particularly if we consider that in 1678 the Venetian aristocrat Elena Cornaro Piscopia became the first woman to be awarded a doctoral degree by the University of Padua, which, however, closed its doors to women less than a year later, and denied access to women for the next 300 years.[14]

Foucault conceives of genealogy as an analysis of "descent" and "emergence" and devotes a great deal of reflection to these two terms, tracing their various uses and connotations in Nietzsche's philosophy. "Descent" records the true objective of genealogy, by excavating the archive to trace numberless beginnings, nuances and subtleties that are not easily captured by the historian's eye. Indeed, if we look closely at the marginalised histories of gender and science, 'there is more to explain than we thought; there are crooked contours that we haven't spotted',[15] as Paul Veyne has lucidly commented on Foucault's idea of the "descent".

Following the move of the "descent" into the archive, "emergence" is attempting to grasp the very "moment of arising",[16] in Foucault's words, in which things appeared as *events* on the stage of history. "Emergence is thus the entry of forces",[17] which throws light on various processes, power relations and discourses that surround the appearance of the *event*, which is just a crucial moment, an episode and not a point in the linearity of historical evolution.

As an analysis of "descent" and "emergence" Foucault's take on genealogy as "eventalisation" is particularly pertinent to the study of the relations between gender, education, and science. Eventalisation is a different approach to the ways in which traditional historians have dealt with the notion of the *event*.[18] It begins with the interrogation of certain evidences in our culture about how things should be: "making visible a singularity at places where there is a temptation to invoke a historical constant, an immediate anthropological trait, or an obviousness which imposes itself uniformly on all".[19] This breach of self-evidences also requires a rethinking of the various power relations that at a certain historical moment decisively influenced the way things were socially and historically established. As Foucault notes, this rethinking reveals "a sort of multiplication or pluralisation of causes".[20] This means that the genealogist does not regard singularity as simply an isolated piece of data to be added to his/her documents. The *event* under scrutiny is to be analysed within the matrix of discursive and material practices that have

[14]See Londa L. Schiebenger, *The Mind has No Sex?: Women in the Origins of Modern Science* (Cambridge, MA: Harvard University Press, 1989), 16.
[15]Paul Veyne, "Foucault Revolutionizes History," in *Foucault and His Interlocutors*, ed. Arnold I. Davidson (Chicago: The University of Chicago Press), 146–82, 156.
[16]Foucault, "Nietzsche, Genealogy, History," 83.
[17]Ibid., 84.
[18]Here it has to be noted that there are differences in how events have been deployed in different schools of historical research, but the engagement with this literature goes well beyond the limitations of this paper. For a recent study in the various uses of the "event" in historiography, philosophy, linguistics, political theory and sociology see Robin-Wagner Pacifici, *What is an Event?* (Chicago: The University of Chicago Press, 2017).
[19]Michel Foucault, "The Ethic of Care for the Self as a Practice for Freedom," in *The Final Foucault*, ed. James Bernauer and David Rasmussen (Cambridge, MA: MIT Press, 1991), 1–20, 76.
[20]Ibid.

given rise to its existence, but also in the light of its effects in the historical course and the historical imagination. The history of women's science education is a field that needs meticulous excavation through the lenses of the *event*, an approach that informs the analysis of this paper.

Following the genealogical move of interrogating the present by excavating its historical constitution, we know that women's right to education was an issue that was raised during the Renaissance, but some of the questions that were debated in the period between 1300 and 1700 have remained unresolved to our own days.[21] As the dominant intellectual movement in Europe during this early modern period, humanism prepared the grounds for the eighteenth-century Enlightenment and, although led by males, it nevertheless created conditions of possibility for women's nature and social position to be re-examined. Although the dominant stance between humanists and Enlightenment male authors was women's biological and intellectual inferiority in relation to men, a closer study of their ideas reveals complexities, ambivalences, gaps and interstices that allowed the emergence of "the other voice".[22]

Here it is important to acknowledge that during the seventeenth and early eighteenth century, which is the period that both Du Châtelet and Agnesi came of age, science was increasingly practised by independent scholars outside the confines of institutions. Judith Zinsser has argued that during the period of this public turn "more women of the privileged classes had an opportunity to engage in the intellectual discourses of their day",[23] an argument that can contextualise both Du Châtelet's and Agnesi's educational opportunities.

Karen Detlefsen, however, has taken issue with the narrative that "when science belonged to exclusive, private institutions, it was dominated by men, and when science became more public, women became practitioners in greater numbers".[24] Without refuting the idea of the "rise of public science", Detlefsen has posed some pertinent questions, regarding the divide between "the private" and the "public", the meanings that we ascribe to institutions, as well as to the very notion of "natural philosophy" itself, given its different connotations in the history of science.[25] What Detlefsen has argued instead is that although there was "a slight respite" of women's marginalisation within the world of scientific knowledge, ideas and debates during the seventeenth century, their overall marginalisation was due to their "exclusion from educational and scientific institutions".[26]

I concur with Detlefsen's argument and throughout my work of writing feminist genealogies I have persistently found that the history of women's education is a history of exclusions, or rather of "marginalisations", as Watts has observed,[27] notwithstanding the

[21]See for example the rich website of the Société Internationale pour l'éducation des femmes de l'Ancien régime, and particularly the theme "Revisiter la querelle des femmes," http://siefar.org/revisiter-la-querelle-des-femmes/ (accessed 29 March 2023).
[22]See Margaret L. King and Albert Rabil Jr, "The Other Voice in Early Modern Europe: Introduction to the Series," in *The Contest for Knowledge*, ed. P. Findlen and R. Messbarger, xi–xxxi.
[23]See Judith Zinsser, "Introduction," in *Men, Women and the Birthing of Modern Science* (DeKalb: Northern Illinois University Press, 2005), 4, 48–67.
[24]Karen Detflensen, "The Rise of a Public Science? Women and Natural Philosophy in the Early Modern Period," in *The Cambridge History of Philosophy of the Scientific Revolution*, ed. David Marshall and Dana Jalobeanu (Cambridge: Cambridge University Press, 2022), 128–45, 129.
[25]See Ibid., 128n1, 141.
[26]Ibid., 142.
[27]Watts, Women in Science, 1.

subtleties, nuances and differentiations that my genealogical excavations of "descent" and "emergence" have brought to the fore.[28] Over the years, scholars in the field of gender and education have worked tirelessly in recovering women's position in the history of education from different angles, perspectives and disciplinary fields and in this context there is a rich body of literature around the history of women's science education in the West.[29] Apart from different discourses around women's access to science education, which have been comprehensively treated in Leigh Whaley's important study on the different debates in the history of gender and science in the Western world,[30] there were also important differences in women's opportunities for education even among neighbouring European states, given their social, cultural, political and religious differences, as well as the diverse philosophical movements and scientific trends that developed within them, as already noted in the introduction.

It is beyond the scope and limitations of this paper to review this literature, but to attend to the most specific genealogical aim of tracing *events* and excavating details, in mapping the context of Du Châtelet's and Agnesi's educational experiences and ideas, it is important to acknowledge that there was a significant difference in the educational opportunities for women in France and the Italian states, during the seventeenth, eighteenth and nineteenth centuries. While women faced hurdles across the board and their education mostly happened within the private domain, it was only in the Italian states that some women were allowed to be connected with formal scientific institutions, such as academies and universities. Moreover, apart from the official academies with rigid structures and controlled access, there was also a different tradition in the informal circulation of knowledge: the *conversazioni* in the Italian states and the *salons* in France.

A lot has been written about the *salons*, as social and intellectual platforms of women's active involvement in the political and cultural formations of modernity, as well as their role in the production and dissemination of literary, philosophical and scientific knowledge in France and throughout Europe.[31] Londa Schiebinger has emphasised that the Parisian *salon* was an "institution of science [while] French *salons* of the seventeenth and eighteenth century competed with academies for the attention of the learned".[32] Although both forms of intellectual gatherings soon surpassed national and ethnic boundaries and became transnational and hybrid formations in the creation and circulation of knowledge, there was also a significant difference between them: while women's role in the French salons was primarily to be promoters of literary and scientific knowledge, several women in the eighteenth-century Italian *conversazioni* made original contributions to the creation of knowledge. As Marta Cavazza has pointed out, this was "a unique historical case" in the diverse histories of the European Enlightenment.[33]

[28]See Maria Tamboukou, *Women, Education and the Self: A Foucauldian Perspective* (Basingstoke: Macmillan, 2003) for further elaboration of the notions of "descent" and "emergence" in the history of women's education.
[29]See for example Hannah Wills, Sadie Harrison, Erika Jones, Rebecca Martin and Farrah Lawrence-Mackey, eds., *Women in the History of Science: A sourcebook* (London: UCL Press, 2023) for a recent overview of this field.
[30]Leigh Whaley, *Women's History as Scientists: A Guide to the Debates* (Santa Barbara: ABC-CLIO, 2003).
[31]See Dena Goodman, *The Republic of Letters: A Cultural History of the French Enlightenment* (Ithaca, NY: Cornell University Press, 1994).
[32]Schiebenger, *The Mind*, 30.
[33]Marta Cavazza, "Between Modesty and Spectacle: Women and Science in Eighteenth Century Italy," in *Italy's Eighteenth Century: Gender and Culture in the Age of the Grand Tour*, ed. Paula Findlen, Catherine Sama, and Wendt Rowarth (Stanford: Stanford University Press, 2009), 275–302, 279.

Whatever their form or function, however – *conversazioni*, *salons*, as well as all sorts of formal, informal, literary and/or scientific academies – such intellectual gatherings had a significant impact on how ideas about women's education significantly changed during the eighteenth century, in Europe. Thus, while most male authors from the Renaissance onwards held the view that it was useless for women to study natural philosophy and mathematics, there were others who encouraged science education for women.

In this backdrop, there were families who saw their daughter's education as a way to advance their social position and prestige – as was the case with Agnesi – but there were also young women who studied alongside their brothers – as was the case with Du Châtelet – or simply followed the scientific study and work of their fathers, or other family members. As Gabriella Berti Logan has noted about the Italian states, the figure of "the exceptional woman" was decisive in the fact that some women were encouraged to include science in their education, as transpires from letters that some male humanist pedagogical authors wrote to advise "exceptional women" of the nobility in the Italian context.[34]

The figure of "the exceptional woman" was certainly important in preparing the grounds not only for defending women's right to science education, but also for accepting that some "exceptional women" could also contribute to the creation and circulation of scientific knowledge through publications and teaching. It is in the context of exceptionality then that Du Châtelet and Agnesi were educated, as I will discuss in the next sections, but their emergence as creators of scientific knowledge rather than passive recipients will be framed within the analytical framework of the *event*, as I will argue throughout the paper.

The trade of knowledge

The Catholic church was influential in girls' education in France in the eighteenth century,[35] but the parental home was the main provider of education for the daughters of the aristocracy, as was indeed the case with Du Châtelet. However, the level and character of education that daughters received very much depended on their parents' interests and aspirations, the quality of their private tutors, and often on the presence of brothers in whose education their sisters would be allowed to participate. Du Châtelet's aristocratic position and dowry notwithstanding, her father was concerned with his daughter's appearance and therefore her chances in the marriage trade: "my youngest is an odd creature, destined to become the homeliest of women. Were it not for the low opinion I hold of several bishops, I would prepare her for a religious life and let her hide in a convent", he had written.[36]

Since Du Châtelet was prepared for celibacy, her father must have thought that a compensation would be to provide her with the best teachers. This was not very difficult since Du Châtelet grew up alongside her younger brother Elisabeth-Théodore, who was

[34]Gabriella Berti Logan, "Italian Women in Science from the Renaissance to the Nineteenth Century," (PhD thesis, University of Ottawa, 1999), 65–7.
[35]See Jean Bloch, "Discourses of Female Education in the Writings of Eighteenth-Century French Women," in *Women, Gender and Enlightenment*, ed. S. Knott and B. Taylor (Basingstoke: Palgrave Mcmillan, 2005), 243–58.
[36]Cited in Samuel Edwards, *The Divine Mistress, A Biography of Émilie Du Châtelet, The Beloved of Voltaire* (New York: David Mckay, 1970), 4.

given a full scholastic curriculum in his parents' home, as he was prepared for a church career.[37] Du Châtelet also had full access to her father's library and from an early age she expressed her desire to become a scholar. By the age of ten she had mastered Latin and by the time she was twelve, she was reading, writing and was fluent in English, Italian, Spanish and German, while she was also "an accomplished musician".[38] Early on, Du Châtelet had showed serious interest in metaphysics and mathematics and she "might have had Euclid's theorems, propositions, and proofs to work through", Zinsser has noted.[39] Within the humanistic content of her education, Châtelet was also interested in theatre and, together with her brother, she was learning and performing scenes from Corneille and Racine.

In his attempt to address her clumsiness, Du Châtelet's father also organised his daughter's physical education, through lessons in fencing, riding and gymnastics. Thus, by the age of fourteen, "she was a superb horsewoman, could beat most gentlemen of the court in a duel and could climb any tree in Paris".[40] Moreover, Du Châtelet was trained in playing billiards, cards and board games, skills that were essential in her future life as a courtier.[41] But it seems that card games were not incompatible with her pursuit of classical readings and mathematics. According to Samuel Edwards, she had discovered the works of Descartes and "when she wasn't playing cards or parading through the palace gardens in her finery, she found a quiet corner in which to read".[42] She was particularly drawn to Descartes's theories of analytical geometry as they interfered with his philosophical meditations on the relationships between mind and matter, soul and body. Her gambling would even finance her reading needs, according to her father, who wrote in a letter: "My daughter is mad. Last week she won more than two thousand golden louis at the card tables, and after ordering new gowns that cost about half of that sum, she spent the other half on new books. I argued with her in vain: she would not understand that no great lord will marry a woman who is seen reading every day".[43]

It goes without saying that Du Châtelet's education was significantly enriched through her involvement in the Parisian salons, her father's included. As Zinsser has noted, the baron's salon held on Thursdays included courtiers, as well as members from the Académie française and the Académie royale des sciences, and thus it should have been an exciting part of Du Châtelet's social, intellectual and cultural life.[44]

The impressive spectrum of her humanistic, scientific and cultural education notwithstanding, when Du Châtelet entered the age of marriage her educational adventures were stalled. It was not "her time" any more, but the time of the marriage trade. She performed all her duties impeccably, getting married and bearing children, but here comes the unexpected twist of her "normal" life as a daughter/wife/mother of the aristocracy. In 1733, less than three months after the birth of her second son, two significant *events* erupted in her life: first she asked the French academician Pierre-Louis Moreau de Maupertuis to become her tutor in mathematics and, second, she met Voltaire.

[37]See Judith P. Zinsser, *Émilie Du Châtelet: Daring Genius of the Enlightenment* (New York: Penguin, 2007), 28.
[38]Ibid., 23.
[39]Ibid., 28.
[40]Edwards, *The Divine Mistress*, 6.
[41]On the importance of gambling in the education of French aristocrats, see Mark Edward Motley, *Becoming a French Aristocrat: The Education of the Court Nobility, 1580-1715* (Princeton: Princeton University Press, 1990), 58–9.
[42]Edwards, *The Divine Mistress*, 11.
[43]Ibid.
[44]Zinsser, *Daring Genius*, 31.

Both *events* disrupted the normative flow of an aristocratic woman's life and expressed two entangled modalities of love: her love for mathematics and her love for Voltaire. It is no wonder that the love for study became central in her philosophical *Discourse on Happiness*.[45] For philosopher Alain Badiou, love as an encounter with the other is indeed an *event*: "in reality, there is for me the encounter with the other, but an encounter is not exactly an experience, it is an *event*, which remains totally opaque and has no reality other than in its multi-formed consequences inside the real world".[46] What I therefore argue is that these "opaque *events*" in Du Châtelet's life marked the beginning of "multi-formed" consequences and initiated processes of becoming an influential scientist, as well as a bright star in the galaxy of the French Enlightenment, although it took some 300 years for 'the *Époque Émilienne* to be acknowledged.[47]

Maupertuis was already a famous mathematician at the time of his encounter with Du Châtelet, a celebrated member of both the Académie française as well as the Académie des sciences. Apart from having regular lessons, usually at her home in Paris, Du Châtelet frequently corresponded with Maupertuis, either to arrange their next lesson or to discuss mathematical problems, but also to express more intimate feelings. Being aware of her intellectual weaknesses she hoped that her desire for learning would compensate for her lack of mathematical skills. From her letters it appears that their lessons would also be an opportunity for social exchanges: "I hope I will have the honour of seeing you on Wednesday, when you leave the Academy [I will wait for you at my place, where I expect you will want to spend the evening]", she wrote to him in January 1734.[48] When later in the same year she suffered the bereavement of the death of her second son, she turned again to Maupertuis for consolation: "My son died last night sir; I confess, I am extremely distressed; I will not go out, as you can understand. If you want to come console me, you will find me alone. Although my door is closed for visitors, I feel that there is no time when I do not find extreme pleasure in seeing you".[49]

Although Du Châtelet eventually had other tutors in mathematics, their correspondence went on throughout the 1730s. Du Châtelet would turn to him for advice while in the course of her most serious scientific writings: "You undoubtedly will have found my question quite ridiculous when I asked you how it followed that the same quantity of motion could subsist in the universe, supposing that the force of bodies in motion is the product of their mass by the square of their speed",[50] she noted, in a letter written from Cirey on 30 April 1738, while she was preparing the publication of her *Institutions de Physique*. While she admits that "you are the master in Israel and I am ignorant and seek to instruct myself trembling before you",[51] she also adds that, ignorant as she was, she had managed to find the answer to her "ridiculous" question: "Since I wrote to you, I read what M. Leibniz gave in the Acta Eruditorum on forces vives, and I saw that he distinguished between the quantity of motion and the distinct quantity of force; and then I found what I needed".[52]

[45] *Discours sur le bonheur, édition critique et commente par Robert Mauzi* (Paris: Les Belles Lettres, 1961).
[46] Alain Badiou, *Éloge de l'amour* (Paris: Flammarion, 2009), 28.
[47] Hagengruber, *Époque Émilienne*.
[48] Du Châtelet to Maupertuis, January 1734, Bibliothèque Nationale de France, "Lettres de la marquise DU CHATELET à M. de Maupertuis. (1734-1741)" [BNF/12269/ff3-4]. Also available in Gallica, https://gallica.bnf.fr/ark:/12148/btv1b6000754n/f367.image.r=maupertuis (accessed 3 November 2022).
[49] Ch to M., late August 1734 [BNF/12269/f15].
[50] Ch to M, [BNF/12269/ff78-80].
[51] Ibid.
[52] Ibid.

Despite her discovery however, she still needed Maupertuis's advice on the metaphysical problem of freedom: "I believe myself free and I do not know if this quantity of force, which is always the same in the universe, does not destroy liberty",[53] since "if we have not the power to begin motion, we are not free",[54] she observed while asking a mathematician to enlighten her, given the pure truth that only mathematical analyses could ever convey. But her turn to Leibniz was also the beginning of a period of estrangement from Maupertuis: "I did not expect you to become Leibnizian, nor that the monads would conquer you",[55] she wrote to him in one of her last letters, sent from Brussels on 8 August 1841, while admitting that "I no longer want to doubt that I am one of the people you love".[56] This was a cold interval in an overall relationship of affection and respect. What is for certain is that their scientific exchanges were both vivid and rigorous and, as Ruth Hagengruber has argued, Maupertuis's correspondence in 1752 shows that he was eventually influenced by Du Châtelet's position during the *vis viva* controversy in 1739, despite his indifference and subsequent disagreement at the time.[57]

Du Châtelet's stormy and eventful relationship with Voltaire has been widely discussed in the literature revolving around them and is certainly beyond the scope of this paper.[58] It was their residence in the Château de Cirey, however, that created space/time/matter conditions of possibility for Du Châtelet's illustrious scientific career. Given the difficulties that women faced in being admitted to the Enlightenment circles of the creation and dissemination of knowledge, it is no wonder that Du Châtelet's first intellectual project came in the form of translation. As Paula Findlen has pointed out, introductions and prefaces of important scientific books and treatises translated by women in the seventeenth and eighteenth centuries were the textual spaces par excellence for the translators' voice to appear, and consequently the most common way for women scientists to exercise authority within the Enlightenment Republic of Letters.[59]

As the dates of the St Petersburg manuscripts show, Du Châtelet must have started working with the translation of the *Fables* in 1835, the same year that she decided to spend most of her time at Cirey in the company of Voltaire: "the decision has been made [. . .] I am about to spend the three happiest months in my life. I leave in four days",[60] she wrote to her friend the Duke de Richelieu, in the middle of June 1735. Joining Voltaire was a testament of her love, but also a new beginning in her life: "My mind is overwhelmed, but my heart swims in joy".[61]

The *Translator's Preface* clears the grounds of her decision to start her new life with an intellectual endeavour: "we lose our own ideas when we neglect to cultivate them",[62] she

[53]Ibid.
[54]Ibid.
[55]Ch to M., 8 August 1841 [BNF/12269/f168-170].
[56]Ibid.
[57]See Waltraud Ernst, "Natural Pleasure: Pierre Louis Moreau de Maupertuis's Contribution to a Materialist Conception of the Erotic," in *Époque Émilienne*, ed. R. Hagengruber, 363–76, 370.
[58]See, amongst others, Ira Wade, *Voltaire and Madame Du Châtelet: An Essay on the Intellectual Activity at Cirey* (Princeton: Princeton University Press, 1941); Nancy Mitford, *Voltaire in Love* (London: Hamish Hamilton, 1957); and David Bodanis, *Passionate Minds: Émilie Du Châtelet, Voltaire, and the Great Love Affair of the Enlightenment* (New York: Three Rivers Press, 2006).
[59]Paula Findlen, "Translating the New Science: Women and the Circulation of Knowledge in Enlightenment Italy," *Configurations* 3, no. 2 (1995): 167–206, 173.
[60]Du Châtelet, *Selected Writings*, 40–1.
[61]Ibid., 41.
[62]Ibid., 44.

wrote. On top of laying out the aim of her study, as well as her philosophy of translation, her *Preface* raised important questions about women's exclusion from education:

> I feel the full weight of prejudice that excludes us [women] so universally from the sciences, this being one of the contradictions of this world, which has always astonished me, as there are great countries whose laws allow us to decide their destiny, but none where we are brought up to think.[63]

Beyond pointing to the barriers that held women unable to think, Du Châtelet further raised critical questions that remain unanswered to our own days: "Let us reflect briefly on why for so many centuries, not one good tragedy, one good poem, one esteemed history, one beautiful painting, one good book of physics, has come from the hands of women".[64]

Following the dominant humanistic discourse of her days, Du Châtelet's defence of women's education was on the grounds of its utility to humanity: "this new system of education that I propose would in all respects be beneficial to the human species".[65] There were no exceptional women in Du Châtelet's intellectual imaginary, since she felt convinced "that many women are either ignorant of their talents, because of the flaws in their education, or bury them out of prejudice and for lack of a bold spirit".[66] Her conviction sprang from her own lived experiences: it was not her exceptional abilities, but rather "chance" that had led her to befriend men of letters, who admired her intellectual abilities and thus triggered the idea "that I was a thinking creature".[67] Since Du Châtelet's reflections on the barriers of women's education were restricted to within the aristocracy, socio-economic conditions were irrelevant in the construction of her rationale.

Du Châtelet's resentment about the failures that inevitably happen when proper science education does not start early was further conveyed in the Preface of her much celebrated *Institutions de Physique*, which was written in support of her son's education: "I have always thought that the most sacred duty of men was to give their children an education that prevented them at a more advanced age from regretting their youth, the only time when one can truly gain instruction".[68] Since her son was "in this happy age when the mind begins to think",[69] Du Châtelet undertook the responsibility of guiding him in the world of scientific knowledge, given the lack of any other book that could do so: "I am often surprised that so many clever people as France possesses have not preceded me in this work that I embark upon for you today",[70] she wrote, while clearing the grounds of her pedagogical intervention: "In this work, I will try to place this science within your reach, and to disengage it from this admirable art, called algebra, which separating things from images, eludes the senses, and speaks only to the understanding".[71]

And yet, the seemingly humble task of guiding her son's understanding in physics turned out to be a much more ambitious epistemological and pedagogical project: "We rise to the knowledge of the truth, like those giants who climbed up to the skies by standing on

[63]Ibid., 48.
[64]Ibid.
[65]Ibid., 49.
[66]Ibid.
[67]Ibid.
[68]Ibid., 116.
[69]Ibid.
[70]Ibid., 117.
[71]Ibid., 116.

the shoulders of one another" she wrote while preparing the grounds of explicating Descartes, Newton and Leibniz, while at the same time pointing to the weaknesses of their respective theories. This was not a problem for Du Châtelet's philosophy of knowledge: "Each philosopher has seen something, and none has seen all; no book is so bad that nothing can be learned from it, and no book is so good that one might not improve it".[72] Science education in this light could only advance through hypotheses, experiments and gradual understanding, a long process in the development of scientific methods, but also an adventure in speculative philosophy, when physics and metaphysics inevitably met: "there are probably some truths not made to be perceived by the eyes of our mind, just as there are objects that those of our body will never perceive".[73]

In commenting on Du Châtelet's thinking and writings on women's minds and education, Detlefsen has noted that "she exhibits a combination of precision and creativity that is one mark of some of the best philosophy", further adding that her ideas and writings erupt from her own lived experiences as a woman who was denied access to formal educational institutions and learned societies.[74] Moreover, her insistence on the importance of hypotheses has been largely ignored in the history of science and, as Gianni Paganini has argued, her "epistemology of hypotheses" is an autonomous contribution and a major innovation in epistemology, methodology, as well as the philosophy of science.[75]

What troubles me, however, in the Preface of the *Institutions de Physique*, is that it is only dedicated to her son Florent Louise, born in 1727, and not to her daughter, Gabrielle-Pauline, born only a year earlier. We do not know much about Gabrielle-Pauline's education, but it seems that she accompanied her mother at Cirey and even took part in the theatrical productions staged by Du Châtelet and Voltaire. She definitely had the experience of convent education, but only intermittently, while her home education included Latin, following her mother's trail.[76] When she got married to a highly ranked aristocratic family in Naples, the mathematician François Jacquier was amongst her visitors there. While communicating with him on scientific issues, Du Châtelet would also ask him about her daughter: "Tell me if you saw my daughter at Naples and if you were happy about it. She must have given birth now",[77] she wrote to him from Versailles, on 17 December 1745.

We do not know whether a famous mathematician's visit meant anything about her daughter's, science education, so it seems that Du Châtelet's ideas on the importance of women's education and the need of a *collège* for women remained limited, even within her own family, but perhaps more research is needed in this area. What is certain is that at the same time as communicating with Jacquier about her scientific work and about her daughter, her correspondent had also taken an interest in Agnesi's forthcoming book in mathematics, *Instituzioni analitiche ad uso della gioventù italiana*, which was about to be published in 1748, as I will further discuss in the next section.[78]

[72]Ibid., 122.
[73]Ibid., 120.
[74]"Du Châtelet on Women's Minds and Education," in *What Makes a Philosopher Great?*, ed. Stephen Hetherington (New York: Routledge, 2017), 128–47, 131.
[75]See Gianni Paganini, "Émilie Du Châtelet's Epistemology of Hypotheses," in *Époque Émilienne*, ed. R. Hagengruber, 21–56.
[76]See Zinsser, *Daring Genius*, 27, 40.
[77]Du Châtelet to Jacquier, 17 December 1745. In Ulla Kölving and Andrew Brown, eds., *La Correspondance d'Emilie du Chatelet* (Ferney-Voltaire, Centre international d'étude du xviii^{e} siècle, 2 vols., 2018), vol. 1, p. 498.
[78]Jacquier to Agnesi, 13 July 1749, Veneranda Biblioteca Ambrosiana, Manoscritti, Agnesi, Maria Gaetana <1718-1799> Lettera a Maria Gaetana Agnesi, Roma 13 luglio 1749/36 [VBA/0.201. SUP/36], f.88.

In search of truth

Agnesi was among the four Italian women[79] who defended women's right to education, during the period that is generally known as "the Italian Enlightenment" (1700–1789). For Mazzotti, Agnesi's becoming a mathematician is an effect of what he configures and charts as Milan's version of "the Catholic Enlightenment",[80] a grid of intelligibility within which education in general and mathematical knowledge in particular become components of faith "for a certain kind of enlightened Catholic, who perceived its philosophical certainty and clarity to be theologically illuminating".[81] In this light, Agnesi's serious involvement in mathematics can become intelligible in the context of her conviction that it was only in mathematics that one could derive certainty, according to Mazzotti. Agnesi's sixth thesis in "the Prolegomena" of her *Philosophical Propositions* powerfully glorifies mathematics as the science par excellence in attaining truth:

> Mathematics must absolutely be counted as a discipline of Philosophy in that it has more right than the others to be called a science, being able to lead us with well-founded certainty to the attainment and contemplation of truth, of which nothing is more delightful.[82]

Mazzotti has further commented that the contemplation of truth through the study of mathematics was for Agnesi "the greatest earthly joy available to mankind".[83] The search for happiness was at the heart of a short essay on ethics that is amongst her early notebooks in the Ambrosiana manuscripts, entitled "De ultimo fine, summon bone, et felicitate naturali [Of the ultimate goal, highest good and natural happiness]".[84] Although the essay is handwritten by Agnesi, as its first page clearly indicates, it is a study on ethics that she followed and should have been given to her by her philosophy tutor, Michele Casati.[85] Although short and unfinished – it comprises twenty pages, structured in four chapters, while the title of the fifth chapter on "Supernatural Beatitude" is announced, but not written. Overall, the study revolves around natural happiness that is connected to knowledge deriving from the intellectual love of God: "true love is the love for knowledge".[86] Agnesi's education in philosophy, ethics and metaphysics thus follows the long Augustinian tradition on the connections between love, knowledge, memory and happiness that has reached modernity through Hannah Arendt's work.[87]

While the Epicureans and their search for natural happiness through pleasure are being castigated in this essay, Mazzotti has commented that "Casati aimed his antimaterialist and antihedonist arguments at closer enemies [...] a response to what was perceived by the Catholic intelligentsia as a wave of attacks against the dichotomy of spirit and matter and their possible materialist implications".[88] Moreover, Agnesi's early

[79]The other three women were Giuseppa Eleonora Barbapiccola, Aretafila Savini de' Rossi and Diamante Medaglia Faini (see Messbarger and Findlen, *The Contest*).
[80]Mazzotti, *The World*.
[81]Paula Findlen, "Calculations of Faith: Mathematics, Philosophy, and Sanctity in 18th-Century Italy (new work on Maria Gaetana Agnesi)," *Historia Mathematica* 38 (2011): 248–91, 256.
[82]Maria Gaetana Agnesi, *Proposizioni Filosofiche*, "Ex Prolegomenis, VI", https://www.centrostudimariopancrazi.it/images/pubblicazioni/proposizioni_filosofiche/proposzioni_filosofiche.pdf (accessed 29 February 2022).
[83]Mazzotti, *The World*, 66.
[84]Veneranda Biblioteca Ambrosiana, Manoscritti, Agnesi, Maria Gaetana <1718-1799> Compendium Ethicae sive Studi di etica seguiti da Maria Gaetana Agnesi nella prima sua età e scritti di sua mano, 0.197.SUP [VBA/M/Agnesi/Ethicae/0.197. SUP].
[85]Mazzotti, *The World*, 46.
[86][VBA/M/Agnesi/Ethicae/0.197. SUP], 9r.
[87]See Maria Tamboukou, *Love, Gender and Agonistic Politics: An Arendtian Approach* (London: Routledge, 2023).
[88]See note 85 above.

engagement with the critique of the Epicureans had an effect on the development of her own philosophical approach to happiness through virtuous behaviour and practices, as well as living in harmony with nature, as her short essay on ethics indicates.[89]

Overall Agnesi's education in science and philosophy was a mixture of the classics, but mostly the Aristotelian, Augustinian and Thomistic traditions, with a selection of some modern thinkers of her time, including Descartes, but also the Dutch and British empiricists. Her studies were indeed methodical and well-structured, following the order of university textbooks that were prevalent at the time.[90] The titles of her notebooks in the Ambrosiana manuscripts show that her studies included mythology (0.183), history (0.184), metaphysics (0.185), physics (0.186–0.191), mathematics and mathematical physics (0.192–0.193, 0.199–0.200), gnomonic (0.194), cosmography (0.195), geometry (0.196) and ethics (0.197). Moreover, a closer study of these notebooks reveals what I have configured as "an agonistic cognitive process".[91] While all notebooks start with well-written texts, their pages often become crowded, with several notes scribbled in the top, bottom, left and right margins of the notebook pages and with many deletions and corrections throughout. It is clear from these notebooks that Agnesi was struggling to understand and critically respond to the received knowledges: hers was not a passive acceptance of merely transmitted wisdom.

It is perhaps because of her own agonism vis-à-vis education that her major scientific work, the *Instituzioni analitiche*, was written for the use of the Italian youth. Agnesi had reached clarity and she wanted to transfer it to the generations after her. Her work was therefore a pure pedagogical act of the highest rank and although she never entered a university lecture theatre, she was teaching through her book, which educated many generations to come. The choice of the collective noun "Italian youth" in the subtitle of her book is not accidental either. Unlike Du Châtelet, who excluded her daughter from the dedication of the *Institutions de Physique*, Agnesi addressed her work to a collective and genderless "youth". This discursive act was consistent with her early *oration* in defence of women's education, to which I now return.

In considering the *event* of the *oration*, where a nine-year-old child delivers a speech to support the thesis that women should not be excluded from the study of the liberal arts, it is important to understand its historical and cultural context, its conditions of possibility, but also its effects. Recall how the genealogical move of eventalisation illuminates power relations and discourses surrounding the emergence of the *event*. In this context the *oration* was performed in the summer of 1727 at the Palazzo Agnesi in Milan, and it was one of many gatherings organised to display the intellectual and art talents of Maria Gaetana Agnesi and her younger sister Maria Teresa. These evenings were organised in the form of *conversazione*. As we have already seen in the first part of the paper, these were intellectual dialogues and disputes on some of the most debated issues in natural philosophy of the mid eighteenth century, such as lights and colours, gravity, the movement of the celestial bodies, the shape of the earth and the nature of tides, amongst others. As Agnesi's notebooks in the Ambrosiana manuscripts show, these debates were very carefully designed, prepared and studied, not only in terms of content, but also in

[89]See *Etica*.
[90]See Mazzotti, *The World*, 47.
[91]See Maria Tamboukou, "Hidden in the Archive of Gender and Science," *History of Education*, forthcoming.

terms of the logic and structure of argumentation. They were therefore an important component of her overall education.[92] The scientific discussions were further followed by musical concerts performed and many times composed by her sister, Maria Teresa, who was a talented musician.[93] However, the particular *event* of the *oration* had connections well beyond the Palazzo Agnesi and the Milanese intelligentsia.

In 1722, the Neapolitan scholar Eleonora Barbapicolla (ca.1700–ca.1740) translated Descartes's *Principles of Philosophy* and in the preface of her translation she argued that the weaknesses of the female sex were not natural and could be surpassed through the study of philosophy and sciences. This translation further contributed to an important debate on women's right to be admitted to the study of sciences and fine arts, which was initiated by the Academia de Ricovrati in Padua in 1723. The president of this academy, Antonio Vallissneri, had strong personal and intellectual ties with the Milanese aristocrat Clelia del Grillo Borromeo, patron of the sciences and the arts.

It is in this intellectual landscape that Agnesi's *oration* was conceived as a project or rather as a performance of knowledge and erudition, "a spectacle" in Marta Cavazza's pithy configuration.[94] Cavazza has shown that the "specularisation" of female knowledge was a literary phenomenon in eighteenth-century Italy and included many cases of young women who were celebrated for their knowledge in philosophical, literary and scientific subjects, mostly in private, but also public gatherings.[95] Agnesi was an ideal performer for such an *event* of specularisation, a living example of women's ability to be educated.

The discourse of the *oration* thus starts with a disclaimer of the risks of the spectacle, the fear that her listeners might turn away from "the frivolous opinion of a clever girl",[96] but unfolds along the lines of exceptionality, the historical fact that several women had become "a marvel of their sex" in the field of scientific and philosophical knowledge. Agnesi's exemplars were numerous and diverse, but they all had a common ground: men's intervention in the education of their daughters, sisters or spouses: "Pythagoras instructed Damo and Themistoclea, his daughter and his sister, in the arts of philosophy to such an extent that the one's supreme intellect brilliantly explicated the style of her father's statements, while the other applied hers to his judgments and conclusions".[97] It is not accidental that the mathematician-to-be Agnesi starts her genealogical investigation in women's education with Pythagoras's daughter and sister, particularly highlighting that they were both educated to become not only expositors, but also creators of knowledge. Hypatia is, of course, the case par excellence of becoming a woman mathematician in her own right: "Hypatia, wife of the philosopher Isidore, certainly seems to have surpassed nonetheless the exceptional nature of this accomplishment".[98]

The turn to the past does not stop in antiquity, but reaches the early modern period, Agnesi's time. Her references to Cornelia Piscopia, "who was bestowed with the public

[92]"Repertorio di diverse Tesi sostenute da Donna Maria Gaetana Agnesi in diverse Academie tenute nella propria casa" [Repertoire of various theses supported by Donna Maria Gaetana Agnesi in various academies held in her own home], VAB. 0.198. SUP.
[93]For detailed descriptions of such events, see de Brosses, *Lettres d'Italie*, 116–18; Anzoletti, *Agnesi*, particularly Chapters 3 and 4, and Mazzotti, *The World*, particularly Chapter 1.
[94]Cavazza, "Between Modesty and Spectacle," 279.
[95]Ibid., 280.
[96]Agnesi, "The Studies," 129.
[97]Ibid., 135.
[98]Ibid., 136.

honour of the philosophical laurels of Padua",[99] as well as to "Daceria, who certainly shed great light on the more obscure works of Homer, and also gave us a metric version of them",[100] thus draws a genealogical line for Agnesi to follow. In the order of the *oration* discourse then, memories of the past shatter and destabilise the present – women's exclusion from education – while opening vistas to different futures. But while past, present and future are brought organically together in the discourse of the *oration*, such new possibilities with regard to women's education can only be realised in the lives of "exceptional women", thus keeping the barriers for the multitude intact.

Notwithstanding the fact that the *oration* was a catalytic *event* in Agnesi's development, it was not written by her, although the mode and extent of her contribution to this text have been debated among Agnesi's biographers.[101] In the genealogical double move of "descent" and "emergence", however, which disrupts the flow of historical continuity, another *event* erupts in Agnesi's becoming. Her *Philosophical Propositions*, published in 1738, is an accomplished piece of scholarship, in which her ideas about women's education and their ability to learn, but also contribute to the creation of knowledge, are clearly articulated. The work comprises 191 theses, which were presented and debated at the Palazzo Agnesi *conversazioni* and revolve around questions of logic, ontology, pneumatology, mechanics, cosmology, geology, botanics and anatomy.[102] Agnesi's notebooks in the Ambrosiana manuscripts carry traces of her hard work on these topics, but the outcome was indeed impressive, both in content and in form. Moreover, in her Prologue, Agnesi firmly defended her conviction that women should be educated, by bringing together nature and history in the development of her argument:

> Nobody will deny that even the weaker sex has had great merits too with regard to all fields of philosophy; in fact, we know that, in addition to the approximately seventy highly educated women, of whom Ménage speaks to us, many others have distinguished themselves at all times, having received the greatest praise for their genius in the philosophical disciplines. Nature has also predisposed female minds to every kind of science and knowledge: therefore, those who completely forbid them from being educated in the liberal arts behave in a rather unfair way: above all for the reason that their studies will not only not be harmful to private and public life, but rather very useful.[103]

Franco Minonzio has noted that with her *Philosophical Propositions*, Agnesi shares the levels of philosophical erudition of her time,[104] while Maria Luisa Anzoletti has noted that this work made her instantly famous in the European intellectual circles.[105] Still it was the publication of her *Analytical Institutions* in 1748 that established her reputation as a renowned mathematician all over Europe, including the offer of a honorary professorial chair in analytical mathematics at the University of Bologna. The work was dedicated to the Empress Maria Teresa of Austria, whose "gracious patronage and protection" the author was craving.[106]

[99]Ibid., 139. We have already referred to Piscopia as the first woman to be awarded a PhD, in the first part of this paper.
[100]Ibid. Anne Lefèvre Dacier (1651–1720) was one of the most celebrated French women of letters at the dawn of the eighteenth century. She translated Homer's *Odyssey* and *Iliad* and defended the ancient literary tradition against "the moderns". See Findlen's "Introduction" to ibid., 125.
[101]Ibid., 121.
[102]Ibid.
[103]Agnesi, *Proposizioni* (Prolegomena III), 45–6.
[104]Franco Minonzio, *Chiarezza e Methodo: L'indagine scientifica di Maria Gaetana Agnesi* [Clarity and Method: The Scientific Investigation of Maria Gaetana Agnesi] (Milano: Lampi di Stampa, 2006), 55.
[105]Maria Luisa Anzoletti, *Maria Gaetane Agnesi* (Milan: L.F. Cogliati, 1900), 154.
[106]Maria Gaetana Agnesi, *Analytical Institutions for the use of the Italian Youth*, trans. John Colson, vol. I (London: Taylor and Wilks, 1801), xvii.

According to the dedication text it was the consideration of the Empress's sex that had inspired the author to persevere, despite the hardships and danger of her intellectual endeavour. But there is a shift in the discourse of exceptionality for Agnesi's major corpus:

> I am fully convinced that in this age, an age which from your reign will be distinguished in latest posterity, every Woman ought to exert herself and endeavour to promote the glory of her sex and to contribute her outmost to increase that lustre, which it happily receives from your Majesty.[107]

It is thus all women that Agnesi is now addressing, inviting them to glorify their sex through the study of science. But despite her call to all women, her work is not gender-specific: it is rather written for the use of the Italian youth and emerges from the author's hard experiences in navigating the world of mathematical sciences: "notwithstanding the strong inclination I had to this science and the great application I made use of to acquire it, I might still have been lost in a maze of inextricable difficulties had I not been assisted by the secure guidance and sage direction of the very learned Father Don Ramiro Rampinelli", she wrote in her Preface.[108] Her tutor was absolutely crucial in Agnesi's development as a mathematician, but as she also noted in the Preface "it is very well known that persons able and willing to teach [mathematics] are not to be found in any city, at least not in our Italy; and everyone that would be glad to learn has not the means of travelling into distant countries, in quest of proper masters".[109]

The Preface thus constructs a rigorous pedagogical argument underpinning the creation of her book but also offers a strong rationale for her decision to write in Italian. Here it is important to note that the book itself is presented as a process, a scientific experiment in becoming: "it was not my intention at first that the following Work should appear in public",[110] she noted. It was something that "began and continued in the Italian tongue, purely for my own private amusement, or at most for the instruction of one of my younger brothers". Recall how for Du Châtelet, it was her son who gave her the inspiration for her own *Institutions de Physique*. When it finally transpired that a volume had been born, "I thought I might be excused the trouble of translating it into Latin".[111] Her decision to publish her book in Italian was further supported by "the example of so many famous Mathematicians, as well Italians as others, who have published their Mathematical Works in their own mother-tongues".[112]

Agnesi's confidence in clearing the pedagogical grounds of her work is astonishing, as is her boldness in asserting that the aim of the book was to be not just a textbook, but also a synthesis and presentation of new developments in the field of mathematical sciences. She acknowledged previous work in the field in what we would now consider as her literature review, and in this process she highlighted the gaps that her work was filling:

> I desire the candid reader to consider that, as the Sciences are daily improving [. . .], many important and useful discoveries have been made by many ingenious writers, as had happened likewise to those who had written before them. Therefore, to save students the trouble of

[107] Ibid., xviii.
[108] Ibid., xxi.
[109] Ibid.
[110] Ibid., xxiii.
[111] Ibid., xxiv.
[112] Ibid.

> seeking these improvements, and newly invented methods, in their several authors, I was persuaded that a new Digest of Analytical Principles might be useful and acceptable.[113]

But apart from assembling new discoveries and methods, Agnesi also demonstrated the necessity of reassembling them in a new configuration: "The late discoveries have obliged me to follow a new arrangement of the several parts",[114] she noted. But here also lies her authorial intervention: "whoever has attempted anything of this kind must be convinced how difficult it is to hit upon such a method as shall have a sufficient degree of perspicuity, and simplicity, omitting everything superfluous, and yet retaining all that is useful and necessary".[115] Agnesi's correspondence with her tutor Rampinelli, but also with Jacopo Ricatti, an important figure in the Italian sciences of the early eighteenth century, is a testament of the difficulties she faced, the hard work she put in preparing her manuscript, as well as the recognition of her originality by well-known mathematicians of her time.[116]

It was therefore in the process of shaping new approaches and methods in mathematical sciences that novelty arises in Agnesi's mathematical work: "in the management of various methods, I think I may venture to say that I have made some improvements in several of them, which I believe will not be devoid of novelty and invention".[117] But at the end of the day it is the reader who should decide on the originality of her contribution. After all, "it was never my design to court applause, being satisfied with having indulged myself in a real and innocent pleasure".[118] The pure pleasure of doing mathematics is boldly articulated here and goes hand in hand with "having endeavoured to be useful to the Public".[119]

In taking Agnesi's magnum opus as an *event*, Alfred North Whitehead's conceptualisation of the *event* as a spatio-temporal unity encompassing past, present and future throws fresh light on her intellectual endeavours. "An event has contemporaries",[120] Whitehead writes, in the sense that it "mirrors within itself the modes of its contemporaries as a display of immediate achievement".[121] But it is not only the present that it condenses, but also the past: "An event has a past"[122] in terms of assembling "the modes of its predecessors as memories which are fused into its own content".[123] Recall how Agnesi acknowledges the relevant literature in the field, past and present, as noted above. But an *event* also has a future, mirroring "within itself such aspects as the future throws back into the present"[124] and in this sense "an event has anticipation",[125] Agnesi's hope that her work has made improvements in reassembling and synthesising past and present work in the mathematical sciences of her time.

[113]Ibid., xxii.
[114]Ibid.
[115]Ibid.
[116]See Clara Silvia Roero, "M.G. Agnesi, R. Rampinelli and the Riccati Family: A Cultural Fellowship Formed for an Important Scientific Purpose, the *Instituzioni analitiche*," *Historia Mathematica* 42 (2015): 296–314.
[117]Ibid., xxiii.
[118]Ibid.
[119]Ibid.
[120]Alfred North Whitehead, *Science and the Modern World* (New York: Free Press, 1967 [1925]), 72.
[121]Ibid.
[122]Ibid.
[123]Ibid.
[124]Ibid., 72–3.
[125]Ibid., 73.

Looking at the existing literature around Agnesi there are several entangled levels of space/faith/culture differentiation that have shaped her overall stance vis-à-vis education, philosophy and mathematics. The fact that Agnesi lived in a city "whose monasteries and colleges were populated by talented clerics teaching mathematics and natural philosophy"[126] had a significant impact upon the way she conceived of the relationship between knowledge and faith, Findlen has commented. Recall the importance of geographies in the making and circulation of science, as discussed in the introduction. But as a matter of fact, Mazzotti's meticulous charting of Agnesi's intellectual world has shown that even within the Milanese context, there were important differences among the educated clerics, philosophers, mathematicians and scientists, as they were themselves followers of various and not rarely opposing theological dogmas, educational philosophies and scientific movements of the time.[127]

Agnesi's ideas about education in general and women's education in particular were thus shaped in a process of catalytic *events* that erupted in her life: her father's decision to use her linguistic and cognitive talent as a pathway to social advancement, the choice of her tutors, who significantly influenced her interest in philosophy, science and mathematics, and last but not least, the illustrious publication of her scientific work. Her decision to withdraw from the world of science and devote herself to the education and care of her immediate community, which was taken shortly after her father's untimely death in 1752, was the final catalytic *event*, the "Agnesi enigma",[128] that is still debated in the literature revolving around her.

Exceptions or *events*?

Du Châtelet and Agnesi were two women mathematicians, scientists and philosophers of the eighteenth century, who were so close and yet so far away, as I have discussed in this paper. What definitely connects them, however, is the image of "the exceptional woman", a dangerous figuration for women in science and mathematics, which has reached our own days. In dissecting the figuration of "the exceptional woman" through her study of the French artist Elisabeth Vigée-Lebrun, Mary Sheriff has considered the gendered politics of its discursive formation.[129] As the public understanding goes, exceptions always confirm the rule, the idea that women were not fit for science, in our case. But if we consider the Latin etymology of the phrase *exceptio firmat regulam*, Sheriff notes, the first meaning of *firmare* is not just to confirm, but rather "to strengthen, support, or fortify".[130] In this linguistic context, *exceptio firmat regulam* means that the exception strengthens the rule, and it was this meaning that entered the *Encyclopédie* in eighteenth-century France.[131]

What are the implications of strengthening the rule then for "the exceptional woman" of science? Not only can she not become the ground on which the rule of women's exclusion from science education can change, but she also cannot become a role model for the

[126]Findlen, "Calculations of Faith," 250.
[127]See Mazzotti, *The World*, particularly Chapter 3, "Trees of Knowledge".
[128]Anzoletti, *Agnesi*.
[129]Mary Sheriff, *The Exceptional Woman: Elisabeth Vigée-Lebrun and the Cultural Politics of Art* (Chicago: University of Chicago Press, 1996).
[130]Ibid., 1.
[131]Ibid., 1–2.

majority of women who are restricted by this rule. As Ruth Messbarger has commented for "the exceptional women" of science: "Their academic brethren typically called them *illustri*, an epithet that in fact relegated them to positions apart from their fellows in the academy and far from the common mass of women, to whom institutional access was unfailingly denied".[132] Being hailed as "exceptional", or *illustri*, women like Du Châtelet and Agnesi were separated from other women, while the price they paid for this separation was double: exceptionality went hand in hand with being abnormal and unruly in the perception of both men and women alike, as Sheriff has poignantly commented.[133]

The problem of exceptionality notwithstanding, it goes without saying that both Du Châtelet and Agnesi opened up new pathways in women's involvement in philosophy and science. If not as exceptional women then, how can we make sense of the extra-ordinary paths of their life and work? What I have argued throughout this paper is that the notion of the *event* becomes a lens through which we can make sense of the process of becoming a woman mathematician and philosopher in eighteenth-century Europe, through ruptures and unexpected emergences that are usually surpassed or remain unnoticed and marginalised in linear conceptualisations of the historical process.

In taking up the notion of the *event* from Foucault's genealogical work, I have further made connections with its ontological underpinnings in Whitehead's process philosophy, wherein "the world is made of events, and nothing but events: happenings rather than things, verbs rather than nouns, processes rather than substances".[134] Departing from good sense, the *event* sticks out from the ordinary, marks historical discontinuities and opens up the future to a series of differentiations. An *event* is a point at which existing laws change and new ones are created. In this light an *event* is an opening onto the possible and even if this possibility is not realised, it will nevertheless persist into the future, preserved in the unconscious of individuals and society, as Deleuze and Guattari have pointed out in thinking about May '68 as a paradigmatic *event*.[135] Feminist philosopher Elizabeth Grosz has also written about "untimely *events*", fleeting ruptures, unexpected rebellions and unforeseeable encounters that disrupt the present and offer glimpses of radical futures.[136]

In this backdrop, Du Châtelet's and Agnesi's engagement with science, philosophy and mathematics is not just an occurrence, or even an exceptional happening. It is rather of the order of an "untimely" or "pure *event*", free of all normal or normative causalities. What counts in the process of their becoming a scientist is the moment of eruption, the moment when they suddenly felt what was intolerable in their life, but also saw the possibility for something else.

By tracing Du Châtelet's and Agnesi's historical emergence as subjects of scientific knowledge, as well as creators of philosophy and culture, I therefore agree with Messbarger's critique of the dangerous image of "the exceptional woman" in science, a discourse that dominates the way women scientists were perceived in the past, but which also reaches our days in new modalities and

[132]Ruth Messbarger, "The Italian Enlightenment Reform of the Querelle des Femmes," in *The Contest for Knowledge*, 1–22, 11.
[133]Sheriff, *The Exceptional Woman*, 2.
[134]Steven Shaviro, *Without Criteria: Kant, Whitehead, Deleuze and Aesthetics* (Cambridge, MA: The MIT Press, 2012), 17.
[135]Deleuze, Gilles, Guattari, Félix. "Mai 68 n'a pas eu lieu. Gilles Deleuze et Félix Guattari reprennent la parole ensemble pour analyser 1984 à la lumière de 1968". *Les Nouvelles Littéraires*, 1984, reprinted in *Chimères* 2007/2 (N° 64), 23–4. https://doi.org/10.3917/chime.064.0023 (accessed November 27, 2022).
[136]Elizabeth Grosz, *The Nick of Time: Politics, Evolution and the Untimely* (Durham, NC: Duke University Press, 2004).

forms.[137] Perceiving Du Châtelet's and Agnesi's emergence as "pure and untimely *events*" in the history of gender and science thus becomes a counter argument in the polyvalent discourses around gender and science education.

Acknowledgements

The author would like to thank the Leverhulme Trust for supporting the project "Numbers and Narratives, a feminist genealogy of automathographies" with a Major Research Fellowship (MRF-2021-004). Many thanks to the archivists of the Ambrosiana Biblioteca in Milan for all their advice and guidance with Maria Gaetana Agnesis's papers.

Disclosure statement

No potential conflict of interest was reported by the author.

Funding

The Leverhulme Trust [MRF-2021-004].

Notes on contributor

Maria Tamboukou is Professor of Feminist Studies at the University of East London and Leverhulme Major Research Fellow for the project Numbers and Narratives: a feminist genealogy of automathographies. (2022-25) She has held academic positions in a number of institutions, including, Affiliated Professor in Gender Studies at Linnaeus University Sweden and Adjunct Professor at Griffith University, Australia. She is the author of 9 monographs, 2 co-authored books, 4 edited volumes on research methods and more than 90 articles and book chapters. She has published in English, Greek and French and her work has been translated in Italian, Norwegian, Portuguese, Spanish, Welsh and Greek. See the author's website for more details on research projects and publications: www.tamboukou.org.

ORCID

Maria Tamboukou http://orcid.org/0000-0002-6380-4415

[137]See Kate Zernike, *The Exceptions: Nancy Hopkins, MIT and the Fight for Women in Science* (New York: Scribner, 2023).