

# LE PÈRE MERSENNE - ON THE ROLE OF A MENTOR IN THE SEVENTEENTH CENTURY

## LE PÈRE MERSENNE - DESPRE ROLUL UNUI MENTOR ÎN SECOLULUI AL XVII-LEA

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### Abstract

*Giving attention to the scientific communities and more precisely to the intellectuals who were 'patrons' of such communities or mentors of important natural philosophers could offer a new interpretation of the story of the scientific revolution. It is certain that these important figures, embodied by the two roles of the mentor and the mediator, had a great influence on changing the attitudes of the scientists at the time and this change could be seen as a cause for the production of a new type of scientific inquiry. Based on this assumption, I want to argue that thinking about these 'intelligencers' as mentors or mediators and using these categories as interchangeable, is a fallacious way to understand their activities and even their purpose. Therefore, aiming to trace some distinction between these two notions I will try to give a plausible interpretation of their relation, arguing for the importance of the mediator's activity for the development of the mentor's role. More precisely, I will use the case of Marin Mersenne to argue that being in the center of a network helped him to efficiently accomplish his mentor's role.*

**Key-words:** *mentor, Mersenne, scientific communities, correspondence, scientific revolution.*

**Cuvinte cheie:** *mentor, Mersenne, comunități științifice, corespondență, revoluție științifică.*

*"The best of men, extremely skilled in all kinds of philosophy" [1]*

### Introduction

The problem of the scientific communities in the late sixteenth and early seventeenth centuries, seen as foundations for the rise of institutions such as the Royal Society in England and l'Académie des Sciences in France, is central for understanding what has been called the "scientific revolution". In the past decades, the role of pre-scientific and informal societies for the production of knowledge, forerunners of the more established and more formal academies, has been the subject of thorough research. However, historians have failed to reach a consensus on a number of important questions. One such important question regards the key roles in these societies and informal networks of researchers that are so important for the birth of modern 'science'. [2] I believe that, when we refer to those centuries as a period of great political and intellectual changes, it is essential to pay attention, firstly, to the diversity of the programmes of scientific research and, secondly, to the intellectual figures who contributed to the development of such programmes.

The transition from Aristotelianism to mechanical philosophy in the seventeenth century was a long and painstaking process. It began as a competition between many theories and programs of research. However, the process was facilitated by formal and informal interactions between competitors and their research programs. In this long and complicated process, the fruitful interactions of the new programs and their realizations, the criteria of research and the new implied

assumptions about the world provided the essential framework for the development of a new and successful natural philosophy.

Concerning the second aspect, to do with the intellectual figures who had an important role in the development of the philosophical programs [3] of the seventeenth century, it is necessary to note that these key persons are interesting for a historian or philosopher of 'science' because they play a double role. Firstly, it is certain that they promoted the networks of communication by which ideas and information were exchanged and transmitted all over the world. Secondly, these 'intelligencers' laid the foundations for the organised scientific institutions which did not develop before the 1660s. [4]

In the shift from the old to the 'new philosophy', the process of communicating knowledge and spreading ideas was of crucial importance. Networks of communication and informal groups of philosophers marked the beginning of institutionalized scientific research in the first part of the seventeenth century. In my paper I intend to give an answer to one specific question, namely: who was in charge of transmitting the new ideas among natural philosophers and scientists right before the emergence of the organised scientific institutions? A first answer to this question could be: the mentors. A second answer could be: the mediators, who created their own research networks of communication of different ideas pertaining to various domains such as theology, mathematics, physics, medicine or music. But such answers would give rise to other questions: who were those figures? In other words: what did it mean for an intellectual of those times to be 'a mentor' or 'a mediator'?

Therefore, there were two vital roles in the newly formed communicational networks. One such role was the mediator. The mediators of the seventeenth century were usually 'savants' interested in the development of a 'new philosophy', who were in charge with the writing, multiplication and sending of letters on a wide range of subjects among various other 'savants' who were recognised for their interest in those topics. Sometimes, the letter-writing activity was combined with the travelling which allowed the mediators to speak directly with the scientists or to witness various experiments and further transmit the results. Moreover, the mediators acted as organizers of correspondence – keeping registers of all letters received from or sent to different people, an activity that will be preserved and further developed by Henry Oldenburg. [5] Another even more important role in the creation of such networks was that of the mentor. On the one hand, like the mediator, the mentor was actively engaged in sending and receiving letters on various subjects regarding the 'new philosophy'. Unlike the mediator, however, the mentor was often a philosopher himself, disseminating his own results along with the others. His position in the network was different. He often activated his own network, created through personal contacts and personal interests. Moreover, the mentor organised meetings useful for the creation of a specific environment for the development of the scientific research. On the other hand the mentor's role had to do with the relation 'tutor–protégé', a relation that was also recognised by the members of the community. In that time, there were also patrons, acting as financial tutors, but in this paper I am not concerned with describing their activity; my only claim is that the financial tutors should be separated from the mentors. Firstly, it is important to note that the relations 'mentor - protégé' were friendly and persistent over years. The second essential characteristic of the mentor's role is the fact that he was accepted and respected by his disciple [6] who received his advice as useful guidance for his future career. His formative role was an indirect one, because the mentor involved the whole community in the guidance of his protégé and because he did not impose his ideas as foundations for his disciple's conception. The third important characteristic of the seventeenth-century mentor was the fact that he used his role of mediator to link together various 'savants' and to create a fruitful environment for the development of his protégé's ideas. His role was not limited only to formulating his own objections or suggestions regarding his disciple's theories but also included inviting other thinkers to formulate counterarguments to those theories.

My thesis is that, in the early modern period, the mediator and the mentor (roles) were not two faces of the same coin. More precisely, I will argue that there was a real distinction between a

mentor and a mediator in terms of a 'subordination' of a mediator to the mentor role. In other words being a mediator is a necessary condition for anyone who desires to become a mentor. My interpretation is that becoming a mentor involved, firstly, being in connexion with various intellectual figures who actively participated in the relation 'tutor - protégé'. Therefore, for the seventeenth century, the idea that someone could be a mentor without being a part of any network seems to me implausible and at the same time (very) improbable. As an illustration of my interpretation, I will focus my attention on one specific character, Marin Mersenne. I will present several aspects of the life of this vital figure for the history of modern thought, arguing for his important contribution to the movements historians nowadays call generically 'the scientific revolution'.

In the book *Mersenne ou la naissance du mecanisme*, [7] Robert Lenoble based his historical reconstruction on two important assumptions. The first assumption is related to Mersenne's role for the advancement of the 'new philosophy': he claims that Mersenne was 'more' than a mediator among the "novatores". [8] Mersenne was an active person, interested not only in theological issues, but also in epistemological and scientific problems. The second assumption, to do with his friendship with Rene Descartes, is that Mersenne was 'more' than Descartes' mentor. This last remark is a legitimate claim, if we think that, until Lenoble's book, Mersenne was a neglected actor on the stage of the history of modern thought. He was recognised only as a friar who had a significant correspondence with several 'savants', including Descartes.

Contrary to Lenoble's proposal, in this paper I will focus precisely on these two roles taken up by Mersenne, as mentor and as mediator, respectively, and will aim to illustrate what happened in the community of the scientists and what it meant for Mersenne to be a mentor. My purpose is to take this point further and claim that it would have been impossible for Mersenne as a mentor to help Descartes in developing his philosophy if he had not been in the centre of an important network, which, in fact, he organised and promoted throughout his life. His intuitions about how to improve the scientific enterprise led to the conclusion that it was absolutely necessary for the intellectuals to meet and discuss their innovative ideas or to share their experimental results. The cabinets and the salons were the first steps in the development of the pre-scientific institutions. In France, Mersenne's circle [9] was one of the most popular groups. I strongly believe that Mersenne's career could successfully exemplify the case of a 'modern mentor' [10]: a key person who made possible the collaborative aspects of research and sustained a whole network of intellectuals. He was, in many ways, the key figure of the new collaborative research, being effective in changing attitudes with regard to the new science. He was as well a philosopher engaged in a relation of 'mentorship' with two of the most interesting characters of the scientific revolution, Descartes and Hobbes. Moreover, I consider that studying some important aspects of his extremely interesting life will help us to understand more clearly how it was possible that such an important shift from the old to the new ideas took place in Early Modern Europe.

Considering himself an opponent of the magicians, sceptics [11] and alchemists, Mersenne was a mathematician and a practitioner of natural philosophy who aimed to solve problems from various fields of knowledge, such as 'natural philosophy' and theology. His program could be divided in two important parts: the experimental and the constructive; both programs led to discoveries and the increase of scientific knowledge. [12] My main purpose is to emphasize the constructive part of Mersenne's program, more precisely the way we can interpret his efforts to establish contacts among the members of a vast community of scientists and what it meant for him to be Descartes' mentor. Based on the division of this program, my presentation will have two parts. In the first part, I will present some interesting aspect of his innovative ideas. In the second part, by writing about Mersenne's circle and his role as Descartes' mentor, I shall try to give a brief answer to the quarrel over the mentor's role in the seventeenth century.

### **Preliminary aspects of Marin Mersenne's life. The role of a *scientist***

As I have already said in the first part of my paper, Marin Mersenne was one of the most important figures of the history of modern thought and he had a vital role in the scientific revolution, as Peter Dear claims in *Mersenne and the Learning of the Schools*. [13] The question is: what is the reason for considering Mersenne a crucial character in 'the scientific revolution'? A plausible answer could be that Mersenne is someone who contributed to the scientific development in many ways during his lifetime. On the one hand, Mersenne was a prolific scientist. In the next paragraphs of my paper I will present some interesting aspects of Mersenne's innovative ideas as they feature in his writings and I will make some brief remarks on his theological-philosophical training.

Mersenne was one of the first students to be trained at the Jesuit College, La Flèche (1604-1609), where he studied the humanities and scholastic philosophy. Subsequently, he went to Paris and for two years he studied theology at the Sorbonne. In 1611 he entered the order of the Minim friars and he began the correspondence with various intellectuals of those times, such as Beeckman, Gassendi and Descartes. In 1619, while in Paris among 'the Minims de l'Annociade' near Place Royale, he was elected "correcteur" and he remained there, except for brief journeys, until his death in 1648.

Even if he is recognised especially for the fact that he was in the centre of the intellectual network which linked together distinguished figures of those decades [14], his innovative ideas can be found in several domains such as music, mathematics, physics and theology. In his correspondence we can find a lot of letters about the problem of harmony, [15] the study of cycloids [16] and the theory of primes or the problem of animals as "automata". [17] These specific issues – the experimental investigation of acoustical quantities, the problem of harmonics or overtones, the problem of finding the area under the curve, the theory of a heliocentric system, the study of light – represent a small part of the problems that interested Mersenne during his life. Moreover, it is less known that Mersenne was an interesting experimental scientist who made numerous material artefacts imitating God's works in nature. [18] The innovative aspect of his enterprise was the fact that those artefacts were experimentally testable by comparison with the natural things. This offered him the possibility to explain phenomena using a hypothetical model, and then to develop even further his physical mathematical conception.

His first book, *Quaestiones celeberrimae in Genesim* (1623), is more focused on religious topics and less on his scientific interests. [19] He presents his arguments in defense of orthodox theology against deists and atheists. However, in the same book he communicates some important parts of the 'new philosophy', such as the arguments in favour of the heliocentric system. Probably the most interesting aspect regarding his first book is that it contains a summary of Galileo's first days in the *Dialogo* (1632). Reading this book it becomes clear that, at that time, Mersennes was still an adherent of the Aristotelian ideas. [20] He explicitly wrote that the intellectuals who were in opposition with Aristotle's philosophy were heretics and atheists. In the preface of his book, Mersenne notes:

"These men who desire to found a new philosophy, and to demonstrate it from fundamental principles, never regard the glory of God". [21]

According to Daniel Garber's study on how Mersenne changed his conception from Aristotelianism to mechanical philosophy, in the early 1630s Mersenne became a promoter of Galileo's mechanics as a result of a serious study of Galileo's astronomical ideas. [22] This study was followed by a translation of Galileo's unpublished treatises on mechanics, which were to appear in 1634 as *Les mechaniques de Galilee*.

*La vérité des sciences* (1625) is another important book by Mersenne because in it he discusses the limits of human reason while arguing at the same time in favour of an experimental method deemed able to increase our scientific knowledge. He asserts that knowledge should freely

advance through experiment and observation, claiming that hypotheses are, at best, probable explanations.

Another important aspect is that books like *Cogitata Physico-Mathematica* (1644), *Questions théologiques, physiques, morales et mathématiques* (1634) or *Traité de l'harmonie universelle* (1636/7) [23] were great opportunities for him to diffuse his original ideas on mathematics and music, respectively, but also to transmit and to share notable ideas of his predecessors, i.e. Euclid, Apollonius and Archimedes, or the ideas of his contemporaries, i.e. Galileo, Hobbes and Descartes. As an illustration of this idea we can note that Mersenne's book, *Cogitata Physico-Mathematica* presents all the ancients' works on this specific topic, being the most important source for the mathematical texts [24] at the time, while *Questions théologiques, physiques, morales et mathématiques* includes a summary of Galileo's arguments for the motion of the earth in the *Dialogo*.

In conclusion, it is relevant to point out that in comparison with other intellectuals [25] also concerned with the development of a strong correspondence network among important natural philosophers from all over the Europe, Mersenne had not abandoned his philosophical ideas and his interest in the 'new philosophy', but rather he produced his own theories in domains like mathematic and music. I will return to his role of mediator in the next part of my paper where I will consider the tasks taken up by such characters as Mersenne, Fabri de Peiresc, [26] Samuel Hartlib [27] or later Henry Oldenburg [28] and the differences between them and Mersenne.

### **Mersenne and Descartes. The role of a mentor**

I believe that in the late sixteenth and early seventeenth centuries it became evident that the scientific research required the existence of a community which had as main purposes, firstly, to scrutinize all the new ideas and, secondly, to transmit the accepted/valid ideas all over Europe. The imperative nature of this kind of communication among philosophers and 'scientists' can be illustrated by the subsequent development of the scientific research. Cabinets and informal scientific academies developed in late sixteenth-century France or Italy as mechanisms for communicating *new* ideas, or as promoting active experimentation and observation of nature. In addition, in France and England numerous libraries or cabinets of curiosities were putting researchers in contact with the new printed books and useful instruments necessary for conducting their research. [29] Mersenne's circle was extremely important in this context. The next step forward in the development of the scientific research was the institutionalised network of correspondence in the 1660s. The most prolific figure who "preserved and extended the tradition" [30] of Peiresc and Mersenne's *mediating* activity was the Englishman Oldenburg, the secretary of *Royal Society*. Along with the rise of scientific institutions such as the *Royal Society* (1660) and *l'Academie de Sciences* (1666) the final aspect of this *organisational* revolution [31] was the appearance of the scientific journals in 1665, i.e. *Journal de Scavants* and *Philosophical Transactions*.

The philosophical programs of the seventeenth century already comprise a refutation of Aristotelianism. Natural philosophers such as Gassendi or Descartes began to *have doubts* about the knowledge offered by the universities and had less and less confidence in the scholastic interpretations of the ancient doctrines. Therefore, they preferred to be part of popular cabinets or salons, and they began their prolific careers as members of these communities. Having this new status they could share with other 'savants' their scientific ideas or they could have the opportunity to discuss several aspects of their individual proposals for the 'new philosophy'. The cabinets' members were also interested in making experiments together or in testing the experimental results received from other scientific communities or foreign academies. The natural philosophers of seventeenth century wanted to know a lot of things from different domains and this specific attitude conducted to the increased performance of the modern scientific research. This attitude among the

scientists produced a great accumulation of ideas, experimental results or theories from many domains such as astronomy, physics, mathematics, music or medicine.

Thus, as Francis Bacon had predicted in his works in the first two decades of the seventeenth century, [32] the institutional tools and the division of intellectual labour led the advancement of the knowledge of nature.

Based on these assumptions, my claim is that outside these pre-scientific institutions (or in the absence of a network of correspondence with the ‘savants’ of the time) the meaning of the characteristically early modern concept of a mentor is hard to understand. In the next part of my paper I will draw a distinction between the two roles of the mentor and the mediator, will argue that at the time the mediator represented a necessary condition for the emergence of the mentor as an intellectual figure that had a number of specific characteristics, and will try to illustrate them with the case of Mersenne.

Retuning to the constructive part of Mersenne’s project it is essential to note that he created *de facto* a corresponding academy. He had an agenda for conducting scientific research as the first step toward the development of one of the first scientific communities. His role was vital for the scientific revolution, not only because he successfully created one of the biggest networks of correspondence, but also because he dedicated part of his time to organising regular meetings with mathematicians and ‘savants’ of his time. It is certain that Mersenne made a great effort to share and transmit various ideas among the intellectuals and the 14,000 letters could be an important proof in this respect. He was probably the most prolific letter-writer of his period. The seventeen-volume edition of his correspondence published in Paris between 1932 and 1988 serves as evidence of his good relationships with natural philosophers in England, Holland or France, and with other patrons or mediators and influential characters of that time. This aspect allows us to conclude that Mersenne’s circle was recognised and appreciated in that period not only in France but all over Europe. Living in France in a room at the Parisian convent of his Order, Mersenne received visitors and organised meetings with the most famous scientists of his time, being sure that a common effort is a necessary condition for the advancement of modern science. This way of exchanging information and experimental results, of debating popular treaties and ideas, led to the development of a large network organised with the intention to create a proper environment for scientific discussions. Probably inspired by the Baconian writings, Mersenne made a proposal in one chapter of his treaties [33], *Les preludes de l’harmonie universelle*, regarding the necessity of a community for the increase of scientific knowledge. Mersenne explained in his work the necessity of greater scientific cooperation and he proposed as a solution the creation of an international academy of science. His ideas can be interpreted as a prediction for the rise of l’Académie des Sciences in seventeenth-century France.

In what follows, I will briefly present some important aspects of the relation between Descartes and Mersenne and will underline the importance of the French friar in the development of Descartes’ philosophical ideas. It is well known that Mersenne was a good friend of Descartes’, as demonstrated by a vast correspondence [34] between the two thinkers during a large period of time, from 1629 to 1647. Mersenne played the role of a confidant for Descartes, and was also his only connection with the French society and his family during the period when Descartes lived in Holland. A good example to illustrate Descartes’ confidence in his tutor’s good intentions could be a letter of April 15<sup>th</sup>, 1630, in which Descartes told him about his plans to create a new physics which could offer the explanation for all the phenomena in the physical world:

“I beg you to believe that I feel myself enormously in your dept for all the kind services you do me, which are too numerous for me to be able to thank you for each individually. I assure you that I will repay you in any way you ask if it is in my power; and I will always tell you my address provided, please, that you tell no one else. If anybody has the idea that I plan to write, please try to remove this impression, not to confirm it; I swear that if I have not been able to carry out mu plan, I would never undertake the task at all. If people are going to think about me, I am civilized enough to be glad that they should think well of me; but I would much prefer them to have not thought of

me at all. I fear fame more than I desire it; I think that those who acquires it always lose some degree of liberty and leisure, which are two things I possess so perfectly and value so highly that there is no monarch in the world rich enough to buy them away from me. This will not prevent me from completing the little treatise I have begun, but I do not want thins to be known so that I shall always be free to disavow it. My work on it is going very slowly, because I take much more pleasure in acquiring knowledge than in putting into writing the little that I know. I am now studying chemistry and anatomy simultaneously; every day I learn something that I cannot find in any book”. [35]

Indeed, this relation prompted Descartes to make public his thoughts on natural philosophy, especially his mathematical and physical ideas. It is also true that Descartes took great precautions when he spoke about his project, because of Galileo’s condemnation and also because he was not very open to objections that could be formulated by his opponents, unlike Mersenne. However, in view of the number of letters sent to Mersenne during the period in which he wrote his treaties *Le Monde*, Descartes was sure that the correspondence with the French Minim would not compromise him. Another example for illustrating Mersenne’s role of a confidant is the exchange of letters on Galileo’s ideas. [36] In November 1633, Descartes sent a letter to Mersenne and noted that:

“I confess that if it [i.e. the theory of the moving earth] is false then so are the whole foundations of my philosophy, because it is demonstrated from them beyond doubt”. [37]

On 14<sup>th</sup> August 1634 Mersenne received another letter in which Descartes wrote that he agreed with Galileo’s idea about the rotation of the Earth, but he disagreed with his methodology. Three years later he wrote another letter on the same subject, complaining about the incompleteness of Galileo’s explanations. [38] These letters testify to two important aspects of their relation – the assumption of confidentiality and Descartes’ liberty to formulate his own ideas in contradiction with his mentor’s ideas.

Probably the most important feature of Mersenne’s personality was the fact that he really wanted to understand his opponents’ ideas and search for the true one rather than reject their approaches from the very beginning. He tried to follow their arguments and also help them to develop further their theories formulating objections and new arguments. This was also the case with Descartes and his metaphysical physics. Mersenne’s role in developing the Cartesian system of thought could be summed up by pointing out three relevant aspects, which are important for the sketch of what it meant to be a mentor in seventeenth-century France. The first aspect is the fact that Mersenne included Descartes’ unpublished thoughts regarding the problem of the fall of bodies in his writing, *Traité de l'harmonie universelle*, and thus made public some of Descartes’ mathematical and physical ideas. The second important aspect is illustrated by the fact that Mersenne invited different thinkers to write objections to Descartes’ *Meditationes de prima philosophia* (1641). Moreover, he wrote to Hobbes a letter in 1640 and told him to write a critique to Descartes’ optical and physical theories, a topic that became the main subject for the later correspondence between Hobbes and Descartes; one year later Mersenne invited him to formulate an objection to Descartes’ *Meditations*. The last aspect which should be mentioned is that during their friendship, Mersenne tried many times to formulate objections to Descartes arguments on problems like the immortality of the soul or the role of God in the world. These objections had a vital role in the development of Descartes’ system of thought by making him aware of the theological implication of his theories.

## Conclusion

In the development of the new scientific communities, the informal networks and societies which developed in the mid-seventeenth century are of vital importance. My attempt in this paper was to distinguish between two very important roles in the development of this early stage of collaborative research in early modern Europe. The mentors and the mediators were the key

characters in the shift from Middle Ages to the early modernity because they created the foundation for the scientific institutions and helped change attitudes toward the role of scientific knowledge. Focusing on the meaning of the role of a seventeenth-century mentor, I claimed that it emerged out of the role of a mediator, in the sense that one's presence and activity in the center of a network was a necessary condition in order to efficiently fulfill the role of a mentor. In this respect, Marin Mersenne represents an interesting case study for the role of a mentor in the seventeenth century. The study of the mentor's role also illuminates the way in which the communities revealed new aspects of the scientific research and propagated communication among intellectuals as the real foundations for the new science.

## References

1. *Thomas Hobbes angli vitae*, p.5 (OL i, p. xiv), note from Hobbes, T., in Malcolm, Noel., ed., *Thomas Hobbes: the correspondence*. 2 vol., Oxford University Press, Oxford, 1994, p. 864.
2. I will use the terms 'new science' or 'science' as equivalents to 'natural philosophy'.
3. I use the word 'philosophical programs' as an equivalent to the natural philosophers' research.
4. The first academies were in Italy, Rome and Florence, Academia del Cimento (1657-1667) and Academia dei Lincei (1603-1630) respectively. In 1660, in England the Royal Society was founded, and in 1666, in France, l'Academie de Sciences.
5. Henry Oldenburg (1618–1677) was secretary to the Royal Society of London; he was responsible for keeping records of the Society's meetings and for maintaining its correspondence with thinkers and scientists throughout Europe (e.g. Johannes Hevel, Christiaan Huygens). In this capacity, Oldenburg played an important role as publicist, promoter, and information gatherer for the new science. He will create the *Philosophical Transactions of the Royal Society* (1665), an important vehicle for scientific informational interchange.
6. I consider that the relation *mentor-disciple* in the early modern Period was different from the same relation in Ancient Greece. The arguments will be presented in the second part of my paper.
7. See Lenoble, R., *Mersenne ou la naissance du mécanisme*, Vrin, Paris, 1943.
8. The term "novatores" is used by Charles Sorel in his book *La Science Universelle* (1634/1648) to individualize the new natural philosophers who were in opposition with the ancients' doctrines.
9. For a detailed description of Mersenne' circle see Beaulieu, A., *Le groupe de Mersenne*, in *Geometry and atomism in the Galilean school*, Florence, 1992, pp.17-34.
10. I will use the term 'modern mentor' or 'mentor' as involving more aspects than the Greek term *Mentōr*; in Greek mythology 'mentor' was used to name Odysseus' friend and Telemachus' tutor. On several occasions in the *Odyssey*, Athena assumes Mentor's form to give advice to Telemachus or Odysseus. His name is proverbial for a faithful and wise adviser, entrusted with the care and education of Telemachus. Regarding the role of a mentor in seventeenth century the educational aspects of his activity disappear, we have only an indirect formative role. The intuitive idea that a mentor is an wise adviser, intellectual superior to his protégé does not apply any more, with necessity. The modern mentor does not guide the protégé's ideas; he can only offer a different point of view which could give birth to relevant advices for the development of the future career of his protégé.
11. I use the term 'sceptic' in his strong sense.
12. Probably the most important contributions of Mersenne were in mathematics and music: the discovery of the prime numbers and the harmonies.
13. See Dear, P., *Mersenne and the learning of the schools*, Cornell University Press, London 1988.
14. His regular visitors, or correspondents from 1620 to 1648, included Peiresc, Gassendi, Descartes, Roberval, Beeckman, Mydorge, J B van Helmont, Fermat, Hobbes, Etienne and Blaise Pascal.
15. Garber, D., 'On the frontlines of the scientific revolution: how Mersenne learned to love Galileo', in *Perspect. Sci.*, vol.. 12, no 2, (2004), pp.135-163.

16. For example the letters to Huygens contains lots of details about Mersenne's study on music.
17. See letters to Roberval.
18. See the correspondence with Issac Beeckman and Descartes.
19. He conducted an experiment with the second pendulum to measure time and confirmed the 'duplicate property' between length and period. He also did some experiments to test Galileo's law of motion for falling bodies.
20. His first treatise contains several discussions on optics and astronomy.
21. See Garber, D., 'On the frontlines of the scientific revolution: how Mersenne learned to love Galileo', in *Perspect. Sci.*, vol. 12, no.2, (2004), pp.135-163; the same idea is illustrated by Duncan, D. 'Mersenne and Modern Learning: the Debate on Music', in Sorell, T., ed., *The Rise of Modern Philosophy*, Clarendon Press, Oxford, 2000, p. 89.
22. Mersenne 1623, *Prefatio*, quoted by Garber, D., 'On the frontlines of the scientific revolution: how Mersenne learned to love Galileo', *Perspect. Sci.*, vol. 12, no. 2, (2004), p. 141.
23. For another interpretation on the change in Mersenne's ideas about Galileo's conception see Duncan, D., 'Mersenne and Modern Learning: the Debate on Music', in Sorell, T., ed., *The Rise of Modern Philosophy*, Clarendon Press, Oxford, 2000, p. 91; The author claims that "Mersenne was converted to Galileo's point of view (...) but neither the views of Descartes nor even those of Galileo would have been enough in themselves to persuade Mersenne to abandon the ancients' ideas".
24. *Traité de l'harmonie universelle* is a work/book on music, acoustics and instruments.
25. Gaukroger, S., *Descartes: an intellectual biography*, Clarendon Press, Oxford, 1997, p.135.
26. A good example could be Fabri de Peiresc which was interested in astronomy but, as Robert Hacht has shown, without being a 'scientist'. It is more plausible to say that Peiresc's contribution to the development of scientific inquiry could be limited to the transmission of astronomical results all over the world.
27. Samuel Hartlib was a seventeenth-century 'savant' interested in science, medicine, agriculture, politics, and education; an active promoter and expert writer in many fields. His main aim was to further knowledge and so he kept in touch with a vast array of contacts, from philosophers (e.g. Robert Boyle) to gentlemen farmers; he maintained a voluminous correspondence.
28. They can be seen as representative founding fathers of prestigious institutions such as the Royal Society in England and L'Académie des Sciences in France.
29. For more details see Sturdy, D., *Science and Social Status: The members of the Academie des Sciences 1666-1750*, Boydell Press, Woodbridge, 1995 and McClellan J., 'Scientific Institutions and the Organization of Science', in Porter, R., ed., *The Cambridge History of science: Eighteenth-century science*, Cambridge University Press, Cambridge, 2003.
30. See Sturdy, D., *Science and Social Status: The members of the Academie des Sciences 1666-1750*, Boydell Press, Woodbridge, 1995, p.165.
31. This term 'organizational revolution' is used by McClellan, see J., McClellan J., 'Scientific Institutions and the Organization of Science', in Porter, R., ed., *The Cambridge History of science: Eighteenth- century science*, Cambridge University Press, Cambridge, 2003, pp. 87-90.
32. Bacon, F., *De augmentis scientiarum*, WFB.
33. I refer to *Traité de l'harmonie universelle*.
34. They met for the first time in the Netherlands, at La Flèche College, sometime between 1625 and 1628. The first letter sent to Mersenne was on 8<sup>th</sup> October, 1629 and the last one on 13<sup>th</sup> December 1647.
35. AT I, 136-137.
36. For more details about Descartes' criticism of Galileo see Ariew, R., 'Descartes as critic of Galileo's scientific methodology', in *Synthese*, vol. 67, no. 1, (1986) pp.77-90.
37. AT I, 271.

38. June 22th, 1637: “I can only say that neither Galileo nor anyone else can determine anything clear and demonstrative with respect to this matter if he does not know first what weight is and does not have the true principles of physics.” (AT I, 392).

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