The Impact of the Enlightenment on the Development of Scientific Fields in the Romanian Provinces

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Abstract

This paper aims to outline certain aspects of the changes brought about by the Age of Enlightenment on the overall progress of society. Emphasis will be placed on its specific features in the Romanian provinces and the impact of this movement on the development of various scientific fields.

Keywords: Enlightenment; Scientific Fields; Development.†

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1. The Age of Enlightenment. A Brief Survey

The Age of Enlightenment, also known as "The Age of Light" or "The Age of Reason," was an intellectual, philosophical, ideological, cultural and anti-feudal movement that unfolded across Europe and the two Americas between the 17th and 19th centuries ([8], p. 474). Its aim was to encourage all individuals to think for themselves rather than allow others to guide them. In other words, this movement wanted to instil confidence in one's own judgement and tendencies. The Enlightenment was an intellectual current which aspired to create the kind of society that would promote culture and faith in natural law and universal order ([11], p. 717). The main initiators of these notions were philosophers, who promoted and popularised notions yet unfamiliar to the general public and endeavoured to discover universally valid principles that would apply to all humankind, nature and society, thus strengthening the sense of faith in the power of reason ([8], p. 474). All these features played an extremely important part in the development of 18th-century society ([11], p. 717). The age was fully against all forms of injustice and constraints imposed on the public, and the current's disciples militated for a free society [25]. The Enlightenment also represented a transition from the Middle Ages to the Modern Era, which indicates that people were in favour of significant changes and wanted to be heard and understood ([15], p. 382). We could argue that the ideas from which the Enlightenment stemmed are at the other end of the spectrum from those of the Middle Ages.

The Enlightenment first emerged in France and later spread across the entire European continent and the two Americas. During the period under discussion, the French state was ruled by king Louis XIV, also known as the Sun King. He amassed around him a cluster of privileged individuals, regarded as high-ranking members of society, who led carefree existences, a state of affairs which triggered discontent among the general population ([20], p. 3). The Enlightenment thus constituted a societal reaction against discrimination based on social status, which aimed above all to do away with the notion of privilege ([24], p. 31). This movement was extremely important for the French nation, because it helped introduce new ideas based on the principles of liberty and equal rights ([20], p. 4).

The main representatives of the French Enlightenment were Voltaire, Jean Jacques Rousseau, Denis Diderot and Charles-Louis Montesquieu.

Charles-Louis de Secondat, Baron de La Brède et de Montesquieu (1689 -1755) was a writer, sociologist, historian, politician and philosopher pertaining to the French Enlightenment ([23], p. 187). His main written works include: *Persian Letters* (1721); *Considerations on the Causes of the Grandeur and*

Decadence of the Romans (1734); *(On) The Spirit of the Laws* (I748) ([4], p. 346).

François-Marie Arouet, who wrote under the nom de plume Voltaire (1694 - 1778), was a French Enlightenment writer and philosopher. He played an extremely important part in the spread of Enlightenment ideas in Europe and the logistics of the French Revolution. His philosophical works include *Letters on the English* (1734), *The Philosophical Dictionary* (1764), *Treatise on Tolerance* (1763), translated into Romanian by such authors as Costache Negruzzi, Ion Heliade-Rădulescu, Grigore Alexandrescu etc. ([14], p. 594).

Jean Jacques Rousseau (1712-1778) was a French Enlightenment pedagogue, writer and philosopher ([23], p. 252). His main works include: *Discourse on the Arts and Sciences* (1750); *Discourse on the Origin and Basis of Inequality Among Men* (1755); *The Social Contract* (1762); *Emile* (1762) ([4], p. 453).

Denis Diderot (1713-1784) was a French Enlightenment writer and philosopher ([14], p. 151). His main works include: *Letter on the Blind for the Use of Those Who Can See* (1749); *Thoughts on the Interpretation of Nature* (1753); *Rameau's Nephew, or the Second Satire* (1762); *D'Alembert's Dream* (1769); *Jacques the Fatalist and his Master* (1771) ([4], p. 131).

The Enlightenment represented an attempt to oust religious dogma and widen the public's horizons through personal experiences. A series of 18th-century scientific and intellectual developments helped promote faith in natural law, universal order, confidence in humankind's capacity for reason and ability to innovate ([11], p. 717).

This period marked the development of scientific fields, the emergence of questions and the birth of new ideas. In other words, the Age of Enlightenment constituted a starting point as far as all types of scientific research are concerned ([3], pp. 19-21). A number of scientific studies published during that period also had significant impact on the consolidation of such ideas. Isaac Newton's discovery of the laws of motion affecting bodies in general (1643-1727) and the mathematical explanations clarifying Kepler's laws regarding the movements of celestial bodies, all published in *Philosophiae Naturalis Principia Mathematica* (*Mathematical Principles of Natural Philosophy*), printed in 1687, represent one such contribution [16]. Later on, the French mathematician and philosopher Jean Le Rond D' Alembert (1717-1783) further contributed to celestial mechanics by building on Newton's ideas. His main work was the famous encyclopaedia, *Encyclopédie, ou dictionnaire raisonné des sciences, des arts et des métiers,* written in collaboration with Diderot, which outlined the importance of scientific truth as opposed to the version of truth promoted by the French church and state ([1], p. 208).

As stated above, the Enlightenment was centred around philosophical knowledge. If the 17th century was based on deduction, intuition and

expectation, the 18th was based on knowledge and analysis. Thus, this century relied on knowledge and the examination of concrete, clear notions. In other words, the 18th century was based on what is known as Newton's method. In order to ascertain whether an idea or a piece of information is accurate, one must always employ a rational idea rather than an assumption as a starting point. We might argue that we are dealing with a cause-and-effect phenomenon. If one's line of reasoning is correct, based on scientific facts, then the result obtained matches it, being equally correct ([3], p. 23). What is more, the followers of 18th-century ideas are in favour of science and reason and against religious ideas and customs. During the historical period under discussion, philosophy represented the foundation of science, providing the necessary answers to the manifold questions that circulated at the time. Philosophy helps one make sense of the phenomena surrounding them. Thus, one can explain certain occurrences or events, previously attributed to mystical forces ([24], pp. 26-27). We can argue that the Enlightenment is based on philosophy because this discipline relies on the idea of reason.

Another fundamental principle of 18th-century Enlightenment is the way in which humans think. In order to label this concept, the French employ the notion of "nature" instead of referring to "experience," a term also used in the southern region of Great Britain. During this historical period, the notion of "nature" comprised the answers to all the questions humankind had raised until then. The difference between the terms preferred by the English and the French respectively resides in that the latter incorporates more ideas into a single one and the ideas in question are considerably closer to reality. In other words, the French concept of "nature" encompasses considerably more content. To their mind, "nature" represents the entire surrounding universe, an object of study to humankind. "Nature" therefore comprises all that is rational, a reassuring notion to humans. However, "nature" also emphasises the inner understanding of human beings. In other words, nature enables human subjects to learn new things, begin to gain a better understanding of themselves, acquire artistic tastes and start to follow their instincts. Nature represents the space where everything, including humankind, originates. Moreover, it explains things previously attributed to religion. Thus, unlike religion, nature does not circumscribe the scope of human beings and allows them the freedom to choose. This comes accompanied by feelings of fulfilment and joy, extremely important aspects in every human existence. In other words, although the concept of "nature" relies on logical reasoning to explain certain happenings or events, it also emphasises human feelings and the ability to acknowledge one's own emotions ([24], pp. 28-29). This new age places considerable emphasis on change, liberty and reason, ideas that help society evolve and implement a new way of thinking ([24], pp. 32-33).

2. The Impact of the Enlightenment on the Development of Scientific Fields in the Romanian Provinces

As a consequence of foreign domination and local feudalism, the Enlightenment took longer to reach the Romanian provinces. In this part of the world, it overlapped to a large extent with the movement known as the Transylvanian School. The Romanian Enlightenment was committed to the cause of national ideals and fully contributed towards outlining the history of the Romanian people and language[19].

In what follows, we will focus on the Romanian Enlightenment, or to be more precise on the cultural current represented by the Transylvanian School and its followers, from the late 18th century until the first half of the 19th century. The main protagonists of this movement are the Romanian inhabitants of Transylvania ([13], pp. 21-22).

Fighting for equal rights represented the main goal of the Romanians of Transylvania, who wanted the Habsburg Empire to treat them fairly ([22], p. 208). Enlightenment scholars fought to have the rights of Transylvanian Romanians formally acknowledged. They established schools, created textbooks and fostered interest in literature and science. This was also the period when books started to be published. It is particularly important to emphasise that the didactical contributions of the Transylvanian School also included the substitution of Latin for Cyrillic letters in written Romanian and indeed the use of Romanian in the writings of the period ([13], p. 21). Thus, the main goal of the representatives of the Transylvanian School was to modernise Romanian through contact with Latin. They played a vital part in the development and modernisation of both Romanian language and Romanian literature [17]. However, this objective was quite difficult to attain because the historical period under discussion was quite problematic. We are dealing in fact with an era in which neither the Romance nature of the Romanian language nor the Roman origin of the Romanian people were acknowledged ([10], p. 168).

The main representatives of the Transylvanian School were Petru Maior, Samuil Micu, Gheorghe Șincai, Ioan Budai Deleanu.

Gheorghe Șincai (1754 - 1816) was a Romanian historian, philologist, translator and writer. He was in charge of the schools pertaining to the Romanian Church United with Rome and of Greek Catholic education in Transylvania. He authored several textbooks, for subjects including arithmetic, and played a vital role in the endeavours to promote culture in the countryside ([9], pp. 395-396).

Ioan Budai-Deleanu (1760-1820) was an influential figure of this current, whose epic *The Gypsiad* [*Țiganiada*] is the most representative literary

embodiment of the spirit of the Enlightenment. The ideas expressed in this epic with antifeudal and anticlerical satirical tendencies represent a plea for democracy. Ioan Budai-Deleanu was a writer, philologist, linguist, historian and jurist, leader of the Transylvanian School ([6], p. 279).

Petru Maior (1756 - 1821) was a noteworthy representative of the Transylvanian School and a significant militant for the rights of Romanians living in Transylvania. Together with other members of the Transylvanian School, he wrote the famous declaration of emancipation of Transylvanian Romanians, *Supplex Libellus Valachorum*. This declaration, whose Latin title translates as *The Petition of Transylvanian Wallachians*, consists of two memoranda submitted by the leaders of the Romanian nation in Transylvania to Leopold II, Holy Roman Emperor. The *Supplex* text references the French Declaration of the Rights of Man and the Citizen and includes several historical justifications, as well as statistical data concerning Romanians (who accounted for 55% of the population of Transylvania). It is based on the ideas of natural rights and Hungarian feudal legal tradition ([9], p. 272).

Samuil Micu (1745 - 1806), whose layman name was Maniu Micu and who was also known as Klein or Clain, was a defender of the old customs and eastern traditions of the Romanian Church United with Rome. Samuil Micu was a Greek Catholic theologian, historian, philologist, lexicographer and philosopher of the Romanian Enlightenment, and a representative of the Transylvanian School ([9], pp. 286-287).

Dinicu Golescu (1777-1830), a Romanian boyar and scholar, was yet another representative of the Romanian Enlightenment. He was the son of Radu Golescu, an important Wallachian politician, and Zoița Florescu. In his work *Însemnare a călătoriei mele* [*Account of My Travels*], the brilliant Wallachian boyar captured the contrast between the advanced civilizations of the countries he visited and the sad realities of his homeland. He thus spread Enlightenment ideas by means of this travel diary, a cultural and political endeavour based on the belief that enlightening the people could help bring about the country's recovery ([7], p. 474).

Ioan Barac (1776-1848), born in the Sibiu area, was a Romanian writer and translator, a representative of the Transylvanian School. A proficient user of Latin, Hungarian and German, he translated numerous literary works, including *The Arabian Nights*. In 1801, Ioan Barac captured the spirit of the Transylvanian School in verse by writing a fairy tale about the Roman conquest of Dacia entitled *The Story of Arghir and Helen, the fair and ravished queen* ([9], p. 75).

These important figures of the Transylvanian School brought the ideas of the Enlightenment into their province. Thus, scholars taught the Romanian population to write their own history, a notion on which this new age was ultimately based ([12], p. pp. 6-7).

Although they succeeded in introducing the ideas of the Enlightenment into Transylvania, not all reforms were acknowledged by the Habsburg Empire. One of them was the introduction of philosophical works, given that philosophy was a building block of the education and emancipation of the Romanian people of the time. The representatives of the Transylvanian School tried to modernise a nation whose way of thinking was based on outdated ideas. This is the reason why this change was to be implemented in stages. Transylvanian scholars were among the few Romanians who managed to study abroad. This changed their mentality, because the environment in which they completed their studies was different from the one they had left. Moreover, the ideas on which that society was based were also different. As a result, modernising and introducing new reforms in the inter-Carpathian space required considerable time and patience ([12], p. 11). The representatives of the Transylvanian School were able to study abroad as a result of adhering to a new religious cult, the Romanian Church United with Rome, thus becoming Greek Catholics ([12], pp. 10-11).

Another Enlightenment idea that scholars wanted to implement in Transylvania was the concept of nation, of united group. Through this, the representatives of the Transylvanian School wanted to highlight the fact that each individual person is important and that social status does not define us. Since this concept was unknown in the inter-Carpathian space, the reforms attempted by the Transylvanian School did not have the desired effect. The main reason behind this was the unequal balance of forces, the minority – majority ratio. Although Romanians represented the majority population of Transylvania, very few of them had access to education ([12], pp. 10-13).

With the passage of time, the representatives of the Enlightenment started to abandon certain metaphysical-theological hypotheses, placing their faith in science instead. Thus, science replaces philosophy, incorporates it and becomes the main instrument and source of views on life and the world. Science becomes the main factor validating or invalidating these concepts ([24], pp. 26-27).

During this period, several scientific fields started to develop more rapidly in the Romanian provinces.

Although something akin to astronomy existed on the Romanian territory during Dacian times, astronomy can only be regarded as a proper science starting from the end of the Middle Ages, experiencing noticeable development in the second half of the 19th century [21]. As early as 1823, the poet Costache Conachi bought a telescope from Vienna. This device was subsequently used to determine the geographical coordinates of several Romanian cities, such as Iaşi, Galaţi, Roman, Bucharest, Constanţa, etc. The first astronomy textbooks were written by A. Marin in 1829, Gheorghe Asachi in 1830 and A. T. Laurian in 1859. The establishment of the first Romanian universities in the second half of the 19th century, first in Iaşi (1860) and then in

Bucharest (1864), can be regarded as the starting point of the study of astronomy in Romania. Neculai Culianu (1832 – 1915) was the first person to teach astronomy in Iaşi. The first astronomical observatory in Romania was built in 1908 in Bucharest [27].

The study of physics also started to take shape on the Romanian territory in the 19th century. The greatest Romanian physicist, Horia Hulubei (1896-1972), established the Institute of Physics of the Romanian Academy in 1949 and later became the director of the Institute of Atomic Physics of Bucharest in 1965 [28].

Mathematics became a proper discipline in the Romanian provinces towards the end of the 18th century, being initially represented by one of its branches, arithmetic. Works published at the end of the 18th century and the beginning of the 19th display some hesitation as far as employing the term *mathematics* is concerned. Synonyms of this word, such as *numeracy* or *calculus*, *calculating* or *arithmetic*, *arithmetic* or *addition* are used instead of it. Additional branches – *trigonometry* and *algebra* – emerged during the same period of time. Trigonometry was also known as *the study of angles* ([2], p. 14).

The development of education played an extremely important part in the validation of the field of mathematics, together with its branches: *algebra*, *geometry*, *arithmetic* and *trigonometry* ([2], p. 14).

As far as means of expression are concerned, the specific symbols still used today started to be employed as early as the final years of the 18th century ([2], p. 16).

As regards the Romanian medical school, Carol Davila (1828-1884) and Nicolae Kretzulescu (1812-1900) established the National School of Medicine and Pharmacy in Bucharest in 1857. The ranks of important representatives of the Romanian school of medicine also included Victor Babeş (1854-1926), Gheorghe Marinescu (1863-1938), Ion Cantacuzino (1863-1934), Ştefan Minovici (1867-1935), etc.[26].

Conclusions

This paper outlined various aspects of the Age of Enlightenment in general, and its impact in the Romanian cultural landscape in particular. The Enlightenment took shape in the Romanian provinces through the ideas introduced and promoted by the representatives of the Transylvanian School. They authored and printed textbooks, fostered interest in literature and science, established schools, replaced Cyrillic with Latin letters in Romanian spelling. This current also shaped the development of scientific fields such as astronomy, physics, mathematics and medicine in the Romanian space.

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