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Conceptual Streams and Mathematical Physical Objects in the Emergency of Newton's Science

Mgr. Marie Benediktová Větrovcová
14:30–15:00

A Social Pre-History of the Strong Programme in the Sociology of Knowledge

Mgr. Libor Benda
15:00–15:30

příspěvky pro 5. mezinárodní konferenci
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History and Historical Epistemology of Science: Conceptual Streams and Mathematical Physical Objects in the Emergency of Newton's Science

In the beginning of 19th century, there was established differential geometry by Leonhard Euler, and Gaspard Monge and his students. Their conceptualization was based on an idea of a surface as a circumference of a given body, a finite, closed, bounded, irregular solid. Euler conceived a notion of curvature of a curve and took elements of curved surface theory by differentials. The French school developed Euler's ideas. Monge described special classes of curved surfaces using second order PDEs.

In this time, astronomy still had an important role of the exact science for which mathematics was a servant for the celestial mechanics. But, after the Napoleon wars in German speaking lands, there was a requirement of new cartography. So, there were founded new observatories and set out associated meridians as a base to strict mapping of lands.

In 1820s, Carl Friedrich Gauss and Heinrich Christian Schumacher made land surveying of Hannover, Holstein, and Denmark with a goal of the pan-European (geodesic) triangulation network. Note that Gauss was a director of the Göttingen observatory and Schumacher founded the observatory in Altona. As a side-effect, geodesy needed a new theoretical and mathematical background by another approach than Euler had offered. In that new one, a surface is an "unfinished" surrounding landscape.

The paper deals with discovering of Gauss' differential geometry in the boundary between a pure mathematics in nature, and applicative aspects for which mathematics became the tool for physical and natural phenomena, in particular in geodesy. It will be concentrated on the important parts from the correspondence between Gauss and his students (Schumacher, Encke...) those illustrate moments of influence pure mathematics on geodesic practice and vice versa, and historical conditions and backgrounds of publishing of Gauss treatises on differential geometry (story of the Copenhagen Royal Society of Science Prize).

Mgr. Marie Benediktová Větrovcová

To Bridge the Gap between the Two Cultures: A Social Pre-History of the Strong Programme in the Sociology of Knowledge

The aim of the paper is to explore the social, cultural and political conditions that contributed to the development of the strong programme in the sociology of knowledge, the first research programme in the tradition of the sociology of scientific knowledge. While the emergence of the strong programme in the 1970s is commonly interpreted only internally as the result of a certain synthesis of philosophical, historical and sociological studies of science, influenced especially by T. S. Kuhn's The Structure of Scientific Revolutions, extra-theoretical factors that played a role in the formation of this approach are largely ignored and excluded from the overall picture.

In the paper I want to focus my attention on these external factors involved in the development of the strong programme, and mainly on the role of the group of the British scientists, who in the late 1930s began to point out the need to bridge the gap between what C. P. Snow later defined in his famous 1959 Rede lecture as the "two cultures". Special attention in this regard will be paid to the biologist C. H. Waddington, who in 1966 founded the Science Studies Unit at the University of Edinburgh, where the strong programme has been subsequently developed by scientifically trained D. Bloor and B. Barnes, and to the radio astronomer D. O. Edge, the first director of the Unit.

On the basis of the provided analysis, I want to argue for the claim that to fully understand the strong programme, it is necessary to view it not just as an independent research programme, but as a result of a broader scientific endeavour to deal with the two cultures problem. Since the strong programme has been repeatedly condemned as a postmodern attack on the authority of science, I want to draw attention to its scientific roots to argue that, far from being "anti-scientific", it represents a most ambitious attempt of scientists themselves to scientifically analyse the relationship between scientific and other forms of knowledge, and between science and society.

Mgr. Libor Benda