

Preface

Distinguished scholar, Agamenon Rodrigues Oliveira, has combined his mechanical and historical skills in a very successful way in this brilliant book on the history of the work concept during pre and post-revolutionary France. His book is devoted to the history of classical mechanics, focusing on the role played by the concept of Work within the history of science. The result is based on a profound historical and epistemological approach which sheds new light on the foundations of science by examining this crucial physical concept and its framework based on the main concepts of space, time, mass and force as fundamental quantities for the development of the concept of work in the history of physics and mechanical sciences.

The book is organized into two main parts (*Conceptual Genesis* and *Instrumental Genesis*) and eight chapters. The book ends with References and an *Analytical Index*.

In [Chaps. 1](#) and [2](#), Oliveira deals with the impact of the concept of work in society within the Marxist debate in order to “[...] remark the influence of Positivist philosophy in general historiography as well as in historiography of science [...]” (p. 37). He then intelligently and gradually discusses the scientific concept of “Work” in the chapters that follow.

[Chapter 3](#) is devoted to the concepts of energy and work in the history of mechanics. The author intelligently avoids banal modern assumptions (p. 71), focusing on the mathematical interpretation of the concepts up through the conservation principle in history. The history of virtual laws is taken into account with great lucidity (p. 78), thus distinguishing this work from other books on the history of mechanical science that have appeared since the *Principle of Virtual Work* became “[...] intensively used as an alternative method to the equations of equilibrium taken from Newton’s laws for a given mechanical system” (*Ivi*).

[Chapter 4](#) is dedicated to rational mechanics within a theoretical and empirical physical context, mainly from Lagrangian to Laplacian sciences where algebra applied to physics moves from mathematics applied to physics to physics–mathematics as a new discipline which emerged in the nineteenth century, particularly in France, Great Britain, Germany and Italy. This was a new methodological approach to solving problems that were physical in origin, where the quantities can be physical and mathematical at the same time (first innovation) and measurements

are not however a priority or a prerogative (second innovation) to establishing a coherent and valid physical science. Therefore, the emergence of physics–mathematics (discipline) belonged to physics, not to an advanced use of mathematics to solve physical problems; physics changed its *face* since within this new physical mathematical discipline it had changed its foundations.

The second part of the book starts with the development of the concept of work in the history of mechanics in Lazare Carnot’s memoirs (1779, 1781). Since he aptly focuses on the fundamental importance and role played by Carnot in the development of the concept of work, I am not surprised that Oliveira profoundly observes that Carnot’s mechanical essays constitute an “[...] important link between d’Alembert and Lagrange [...]” (p. 127). I have also examined mechanics and complex French mechanical and thermodynamic sciences. As a historian, I believe that Oliveira’s effort to profoundly examine the crucial role played by virtual issues in the work of Lazare Carnot (1753–1823) and other important French scholars will be greatly appreciated by historians of science and researchers in mechanics. In particular, Oliveira maintains that the foundations, impact and heritage of Lazare Carnot’s mechanics (Chaps. 5 and 6) have resulted in the formulation of a law of virtual work which is generalized for dynamics: the mechanics of the impact of hard bodies, virtual velocity and (geometric) motion demonstrate how the *Organisateur de la victoire, l’homme des machines en général*, succeeded in formulating a generalized virtual law to evaluate the velocities of a system of hard bodies of which the initial velocity is known. A special debate on the views of the scholars of *École polytechnique* is also included (Chap. 7).

Finally, in the conclusion, general comments are presented from historical, political and economic standpoints, where “Being more concerned with a history of applied mechanics where the principal characters are renowned figures whose names frequently appear in engineering manuals [the final part of the book] represent a modest contribution to the history of mechanical engineering. It should be highlighted that science history texts dealing with the more applied sciences are very rare. Normally they are histories of the basic disciplines, such as mathematics, physics, chemistry or biology.” (p. 208).

Oliveira has written an interesting scientific and historical essay revealing an impressive knowledge of the vast amount of original and modern publications regarding the history and epistemology of science; he helps readers avoid losing track of the historical path of arguments dealt with by using reasoning, summaries and illustrations. From a methodological and historical point of view I am also particularly appreciative of the effort to produce a history of science based on standpoints in history which are interpreted epistemologically.

The book’s composition makes for absorbing reading.

Agamenon Rodrigues Oliveira has produced an important study and a significant contribution of support for mechanics, engineers, physicists, historians and epistemologists of mechanical and mathematical physical sciences.

Please enjoy this stimulating read!

A History of the Work Concept

From Physics to Economics

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