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ON THE INFLUENCE OF DESCARTES, LEIBNIZ AND NEWTON
ON KANT'S FIRST APPROACH
TO THE PROBLEM OF SPACE AND ITS DIMENSIONALITY

Abstract

The idea of relating space dimensionality to a physical law presented in Kant's first written work – *Thoughts on the True Estimation of Living Forces* – reveals such a new and original way of looking at the relationship between Physics and Mathematics that only in the Twentieth century could be completely understood. We are thinking about Ehrenfest's "In what way does it become manifest in the fundamental laws of physics that space has three dimensions?". In this essay we try to understand some of the physical, philosophical and theological foundations of Kant's approach to this problem, and its place in the debate of ideas which gave support to the Mechanicist Worldview. First of all, it is emphasized that a careful reading of Kant's *Gedanken von der wahren Schätzung der lebendigen Kräfte* leads us to conclude that – differently from what is normally accepted – Kant did not prove his conjecture that the tridimensionality of *space* could be found in Newton's law of gravitation, according to which the force between two bodies decreases with the square of the distance separating them. It is shown here that he limited himself to justify the tridimensionality of *extension*. After settling the distinction between extension and space, it is argued that the logical chain of young Kant's conjecture starts from the assumption that *force* is a basilar concept, intrinsic to the substances. It is from this force that relations between the substances are established, whereby order is created and space concept is ultimately found. It must be stressed that the coherence of Kant's argument requires, in the last analysis, that for him perception, *i.e.*, the interaction between substances and soul, results from the same long range force. In addition, it is shown that Kant's argument could not be constructed in a purely Newtonian framework at that time (1747). Indeed, he built his proof on a world conception extracted from Descartes' legacy (mainly the idea of cosmic order) and Leibniz's heritage (the existence of a force that precedes extension, and that space is relative) on which, in a hybrid way, Newton's law of gravitation is included. It is argued that this choice was strongly influenced by young Kant's theological ideas which depart from those of Descartes, Leibniz, and Newton. It was this hybrid character of his approach that allowed Kant to raise the question of dimensionality of space as a physical problem, but, at the same time, due to its intrinsic limitations, led him to prove only the tridimensionality of extension.