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Title: ‘One common matter’ in Descartes’ physics: the Cartesian concepts of matter quantities, weight and gravity.

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The purpose of this paper is to challenge the common view that discredits Descartes’ physics because “it does not involve an understanding of an object’s matter quantity independently of its size”. It provides new insights on Cartesian matter, as well as a clarification of weight and gravity in Descartes’ physics. Cartesian weight is presented as relational and not as an internal quality of bodies, directly related to the elements composing a body and the ways the composing matter of a body interacts with the matter surrounding it. The paper, thus, shows how Descartes’ theory can account for density variations in spite of holding the impossibility of vacuum. Descartes makes density dependent on the composition of a body (from the first, second or third of the elements he proposes), so it is dependent on the types of matter it consists of, which can account for densities’ differences. The same will happen with other properties, such as its heaviness, and heaviness determines its interaction with other bodies, which would explain gravity. So, without recurring to mysterious forces acting at a distance, Descartes’ physics is able to explain the motion of bodies and the main force responsible for its interaction, i.e. gravity. Although his theory is still far from proposing a mathematical relation able to account for universal gravitation.

The knowledge of Cartesian theory is important to the history of physics, since even if the theory was in the end not correct, it cannot be discarded for the wrong reasons, i.e. for not being able to explain differences in weight by differences in size. Besides, Descartes’ physics provides us with the first complete system

able to account for the motions of both earthly and heavenly bodies, and if only because of that accomplishment, it is worth being known.