

The explanation of Enders' doubts about an analysis of Newton's dynamics

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In my approach to mechanics the essence of Newton's mathematical physics is recognized. A new understanding of Newton apparatus of scientific theory is investigated according to philosophy of science of T. Grabińska, developed at Wrocław theoretical physics school. A new contribution to the reception of Newton's physics is proposed in the framework which is important for methodology of physics and empirical sciences. The scientific investigations of the foundation of Newton's theory cannot be reduced to the simple linguistic quotation of this or that translation of Newton's "Principia" or the words from university text books. The problem of Newton's physics is not linguistic. It is not related to language (language history, philological semantics, applications in translation, teaching, etc.)

The essence of Newton's physics is the problem of the logic of science, not of the interdisciplinary linguistics, e.g., grammar, socio-linguistics, psycho-linguistics, historical linguistics, comparison communication, neuro-linguistical searches, etc.

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I should answer Dr. Peter Enders [1] who has wrongly considered my article about the content of three Newton's laws of dynamics [2] as the polemics with theses expressed in his earlier paper, published in *Apeiron* [3]. The aim of my paper [2] was to make a supplementary contribution to the reception of original Newton's proposal. The intention of [2] was not to discuss with Dr. Enders, whose first article [3] is composed of only quotations from Newton and short comments by the author: In his paper Enders [3] briefly commented on some fragments of Newton's *Principia*. I found nothing wrong in his comments but I liked to call physicists' attention to a wider context of analysis of scientific theory language. I liked to show that even the most precise analysis which is based on purely linguistic method (as Enders') is not enough to understand the whole conceptual (notional) apparatus of scientific theory.

The investigation of theoretical conceptual apparatus is known from scientific language analyses given by logical empiricists [4]. My analysis of Newtonian dynamics principles, published in *Apeiron*, transcends the analyses of logical empiricists, because I search the theoretical language not only in the framework of empirical operations (as logical empiricists had done) but additionally I include the mutual relations between physical and mathematical notions [2], [5]. So, Enders' explanations in his article [1] in *Apeiron* are not exactly unimportant but they are essentially not appropriate to the contents of my paper.

The part of Ender's ten remarks is purely linguistic and is not related to deeper analysis of Newton's dynamics but to lingual formulations (English words) or translatory problems from Latin to English, as his remarks 1, 2, 8, 9, (e.g. the detailed comparison of

Motte's and Cohen's translations of Newtonian *Principia*). Similar problems appear always when the subject of translation (here the language of scientific theory) is much more complex than the subject of everyday or technical communication.

Let me assume an attitude towards remaining Enders' remarks., namely 3. and 4., 5., 6., 7., 10, and his Summary.

Ad 3. and 4.

Dr. Enders claims that my sentence about the first foretelling of wave-corporuscula dualism in Newton's theory is unhistoric. Of course, historically this dualism appeared in physics later. However, my conclusion is the result of deeper comprehension and reconstruction of Newtonian considerations. From one side Newton was the adherent of corpuscular concept of substance, from the other side – as among other things Enders showed in his first paper [3] – Newton had borne the field propagation in mind. So, this propagation cannot be regarded as corpuscular propagation but as a wave. Newton didn't had written about the dualism explicitly. The interpretation, however, of such two ways of propagation pointed out the the wave-corporuscula dualism.

Ad 5.

Enders' claiming, that in my paper there is a disconcordance between the original form and today form of Newton's formulation, does not fit to subject of my paper. I am studying the physical, mathematical and ontological contents of the principles [5]. In such a studying the specific formulation is not so important. The standard formulation of Newton's principles, which is presented in many elementary textbooks, is close to the original one:

1. As long as an impression of forces on a given body does not change its state, the body is in the state of rest or it continues to move uniformly and rectilinearly.

2. The change of motion is ever proportional to the impression of force and the direction of the change is the same as the direction of impressing force.
3. Two bodies interact with forces which quantities are equal and their directions are opposite.

In the more extended formulation of the second principle there is introduced a mathematical formula: $m_1 dv/dt = F$, where m_1 is the inertial mass of moving body, dv/dt is the vector of change of motion (acceleration), F is the vector of force, v is the vector of velocity, t is time.

Ad 6.

Of course, there are different formulations of mechanics equivalent to the Newtonian one. The most famous are Lagrangean and Hamiltonian formalisms. They, similarly as the Euler's approach, are founded on different principles and in different languages than the Newtonian formulation. Therefore in my paper not the notion of state, but the notion of the **change** (alteration) of state (as in Newtonian formulation) is central (is a basic notion). In an analysis of Euler's approach to mechanics, the central point could be the notion of state.

Ad 7.

The statement that the mathematization of physics is originated in Newton's dynamics is a truism. Newton (and Leibniz independently) discovered differential and integral calculus to make the quantitative representation of his new concept of the change of motion. It should be evident.

I can agree only with second part of this Enders' remark on the goal of [3], that his paper was not to explore 'the essence of Newton's physics. For me the essence of Newton mechanics, extracted from the reach language analysis, is the most important goal.

Ad 10 and ad Summary.

I understand the paper [1] of Enders very well. He thinks wrongly that I criticise his work [3] in my work [2], whereas literally the very form of Enders paper [3] is not suitable for criticism. Dr. Enders seems not to understand not only my paper but also all the framework of analysis of scientific theory language [6].

References

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