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Reform of the construction of the number system with reference to Gottlob Frege.

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Summary: Due to missing ontological commitments Frege rejected Hilbert's Fundamentals of Geometry as well as the construction of the system of real numbers by Dedekind and Cantor. Almost all of school mathematics is ontologically committed. Therefore, H.-G. Steiner considered Frege's viewpoint of mathematics fundamentals, refined by Tarski's semantics, as suitable for math education. Frege committed numbers ontologically by using measurement to define numbers. He invented the concept of quantitative domain (Größengebiet), which - it is now known by reconstruction of that concept by the New-Fregean Movement - agrees with the concept of quantity domain (Größenbereich) as established in the German reform of the application-oriented construction of the system of real numbers. Concepts of quantity (ratio-scale) and interval-scale in comparative measurement theory - going beyond Frege - show the way how the negative numbers can be ontologically committed and the operations of addition and multiplication can be included. In this work it is shown how Frege's viewpoint of mathematics fundamentals, as propagated by H.-G. Steiner, can be better implemented in the current construction of the system of real numbers in school.

Classification: F50 F10 E20 D20

Keywords: number concepts; construction of the system of real numbers; foundations of mathematics; mathematics and philosophy; ontological commitments; H.-G. Steiner

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