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John Leslie’s View of Arithmetic and its Relevance for Modern Pedagogy

Abstract :

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John Leslie in his book Philosophy of Arithmetic (Leslie, 1817) provided two parallel versions of elementary arithmetic: palpable, where computations are carried out on a counting board, and figurate, where computations are carried out in writing. His book contains two very original ideas. He takes halving with a remainder, or partitioning a set into more than two equal subsets, instead of counting, for a basic arithmetic operation. This allows him to develop the arithmetic processes and notation for numbers, without any reference to a user’s linguistic background. Number words are optional and not a prerequisite for learning arithmetic. Also, no writing skills are required during palpable computations with counters. He also uses “negative digits” in all computations, in a manner that is similar to the use of two-color rods in ancient China (Hart, 2011). In Europe negative numbers were not part of arithmetic, but negative digits were used for representing positive numbers (Colson, 1726). Leslie used his own terminology for negative digits, calling them empty or deficient counters and deficient figures. We adapted Leslie’s approach to the modern school setting, showing how it can be used in early grades. This method may be useful in multilingual classrooms and when some pupils have inadequate writing skills. The counting boards described by Leslie are inadequate for modern school use, so we replaced them with boards designed on the principle that is described by John Napier in Rabdology (Napier, 1619). In our talk we will summarize Leslie’s book

and provide a brief description of changes in the sequence of topics that are needed in order to implement his approach. And we will provide one or two lesson plans for early grades that illustrate how some specific topics can be handled within such a framework. Leslie, John (1817). Philosophy of Arithmetic, Edinburgh: Abernathy & Walker. Hart, Roger (2011). The Chinese Roots of Linear Algebra, Baltimore: Johns Hopkins University Press Colson, John (1726). A Short Account of Negativo-Affirmativo Arithmetik, Philosophical Transactions of the Royal Society 34:161-173 (http://www.jstor.org/stable/103469) Napier, John (1617/1990). Rabdology (trans. Richardson WF). Charles Babbage Institute Reprint, Cambridge, MA: MIT Press.