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Learning and understanding numeral systems: semantic aspects of number representations from an educational perspective.

Löwe, Benedikt (ed.) et al., PhiMSAMP. Philosophy of Mathematics: Sociological aspects and mathematical practice. Including selected papers of the 3rd PhiMSAMP conference ‘Is mathematics special?’, Vienna, Austria, 2008. London: College Publications (ISBN 978-1-904987-95-6/pbk). Texts in Philosophy 11, 235-264 (2010).

The authors’ stated aim is to “. . . look at the basic arithmetic operations of addition, subtraction, and multiplication. For each of these we first describe the main difficulties that students reveal by making systematic errors in their computations in the decimal place-value system. Then, we discuss semantic tools that have been proposed in the didactical literature and are used in schoolbooks to develop a better semantic understanding of the basic written algorithms for these operations. Finally, we present how the computations could be carried out with Roman numerals, which is a purely additive system of numerals.” The familiar Roman numeral “subtractive conventions,” e.g. using IX for nine, are excluded, as these were introduced in the Middle Ages and violate the semantics of a purely additive system. Their method of Roman numeral multiplication is essentially lattice multiplication.

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Classification: F30 C30 D40

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