THE NUMBER CONCEPT AND THE ROLE OF ZERO IN NORTHERN-EUROPEAN ARITHMETIC TEXTBOOKS

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Abstract

One and zero have always existed in arithmetic textbooks. In modern sense they are numbers. It has not always been so. The Greek view was that a number is a multitude of units. This has often been interpreted as one was not a number. The zero was introduced within the Hindu-Arabic numeration, originally as a symbol to designate an empty slot, and as one of the ten digits in the early thirteenth century. For a long time it had a special position among the digits, called insignificant digit.

These views are reflected in Northern European writings that have influenced Icelandic arithmetic textbooks from the thirteenth century up through the nineteenth century. The foundation of the number concept was laid in the thirteenth-century manuscript Algorismus. Those who were concerned with arithmetic in Iceland through the centuries seem to have been familiar with that manuscript. They did not ignore the ancient definition of a number, in spite of the paradoxical situation it created when the number system was to be extended. Some authors had doubts though about not counting one as a number, while the zero was primarily a digit.

The ancient number definition did not cause serious difficulties until the algebra had developed and a need for negative numbers had been established. L. Euler was an entrepreneur in his intuitive definition of the number concept. However, e.g. Danish textbook-writers in the early- and mid-nineteenth century either did not address the matter directly or had some reservations, especially about the zero. The Icelandic mathematician B. Guðnlaugsson, who acquired his education in Copenhagen in the early 19th century and knew Euler’s work, did not accept the zero as a number or a quantity but considered it to be the limit of quantities.

The great works on the foundation of the number concept were done by Dedekind and Cantor in 1872, Frege in 1884 and Peano in 1889. Mathematics teachers in Iceland in that period had only short training in mathematics and had pragmatic approach to their teaching. Philosophical considerations about the number concept do not either seem to have concerned arithmetic textbooks writers, most of whom were priests. They were busily building up public education from scratch, more down to earth task than to be concerned with the philosophical foundation of arithmetic.

The first twentieth century Icelandic mathematician, Ó. Danielsson, wrote his arithmetic and algebra textbooks in 1906–1927. His writings do not reveal any doubt about the foundations of 0 and 1 as numbers and his education in Copenhagen around the year 1900 has probably been well grounded in the modern understanding. However, it is only in his 1927 algebra textbook that zero is seen to be counted expressly as a number, for the first time in Icelandic mathematics textbooks. This was repeated in 1928 in textbooks on arithmetic for children.
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