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Do school-age children learn that $2 \times 3 = 3 \times 2$ relying on previous intuitions?

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Abstract

Commutativity—the fact that changing the order of operands in an operation does not change the result—is a fundamental principle of mathematics. How does its understanding develop in children? While this question has mostly been addressed for addition, here we focus on multiplication. We ask whether children’s formal learning of multiplication commutativity relies on pre-existing non-symbolic intuitions, or whether it is first learnt symbolically and only later elaborated as a general principle that extends to concrete situations. 2nd and 3rd graders received an intervention on commutative multiplication, before and after which they played a number comparison game testing their understanding of commutativity in symbolic and non-symbolic contexts. Our results suggest that the commutative principle of multiplication may not be available to intuition before formal teaching: perceiving that 2 groups of 3 dots and 3 groups of 2 dots contain the same number of dots requires mastering commutativity symbolically first.