

**ZMATH 2016f.00825**

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**The precision of mapping between number words and the approximate number system predicts children's formal math abilities.**

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Summary: Children can represent number in at least two ways: by using their non-verbal, intuitive approximate number system (ANS) and by using words and symbols to count and represent numbers exactly. Furthermore, by the time they are 5 years old, children can map between the ANS and number words, as evidenced by their ability to verbally estimate numbers of items without counting. How does the quality of the mapping between approximate and exact numbers relate to children's math abilities? The role of the ANS-number word mapping in math competence remains controversial for at least two reasons. First, previous work has not examined the relation between verbal estimation and distinct subtypes of math abilities. Second, previous work has not addressed how distinct components of verbal estimation – mapping accuracy and variability – might each relate to math performance. Here, we addressed these gaps by measuring individual differences in ANS precision, verbal number estimation, and formal and informal math abilities in 5- to 7-year-old children. We found that verbal estimation variability, but not estimation accuracy, predicted formal math abilities, even when controlling for age, expressive vocabulary, and ANS precision, and that it mediated the link between ANS precision and overall math ability. These findings suggest that variability in the ANS-number word mapping may be especially important for formal math abilities.

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*Keywords:* number estimation; approximate number system; informal math; formal math; individual differences; ANS-number word mapping

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