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Math ability varies independently of number estimation in the Tsiman

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Abstract

How do people reason about mathematical concepts like addition and subtraction? According to one proposal, mathematical thinking is supported in part by the approximate number system (ANS), a primitive cognitive system for estimating the numerosity of a set, without counting. Here we tested this proposal in the Tsiman, a culture of farmer-foragers in the Bolivian Amazon. Compared to industrialized societies like the US, the Tsiman have high variability in their level of education and number knowledge. In a large sample of Tsiman adults, math ability was positively correlated with ANS performance, consistent with previous findings. However, this correlation disappeared when controlling for participants education, and when controlling for their ability to sustain attention. These findings challenge the claim that the ANS supports math ability. Rather, performance on ANS tasks and math tasks may both be shaped by non-numerical abilities practiced (or selected for) in educational settings.