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# The role of cultural support on commutativity at varying levels of abstraction

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## Abstract

We explore whether people can infer the principle of additive commutativity in the absence of cultural support—such as formal schooling and market experience. Our prior research shows that unschooled Tsimane' adults do not succeed on abstract symbolic and word problem commutativity tasks. In a new study, we implement a concrete commutativity task with tangible tokens, including sums with specified (e.g.  $2+1$  vs.  $1+2$ ) and unspecified (e.g.  $2+\text{Dax}$  vs.  $\text{Dax}+2$ ) quantities. We find significantly better performance on concrete tasks than in abstract tasks, even in Tsimane' participants with limited levels of formal schooling and other cultural supports. This suggests that cultural support is not necessary to understand the commutative principle, but is necessary to apply it to more abstract problems.