Mathematical Proficiency: Number Acuity vs. Numeracy

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Abstract: Mathematical proficiency is central to success in everyday life, yet its cognitive foundations remain unclear. In previous study, two cognitive abilities have emerged as likely prerequisites – proficiency with symbolic and non-symbolic numbers. In this study, we examined arithmetic proficiency as a function of individual differences in six tasks: symbolic and non-symbolic addition, numerical estimation, and number comparison. As in previous studies, true was robust ratio effect evident in our tasks, while the weber fraction implied from two tasks did not correlate with arithmetic proficiency, nor between tasks, nor even between blocks of the one task. In contrast, accuracy of numerical estimation was correlated with arithmetic proficiency, with other accuracy of estimation, and was reliable within subjects. These findings indicate that numeracy is a better predictor for mathematical proficiency than number acuity.