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Going Beyond Intelligence: A Systematic Investigation of Cognitive Abilities and Personality Traits of Experts in Mathematics.

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While the cognitive foundations for mathematical abilities have been investigated thoroughly in individuals with and without mathematical difficulties, our current knowledge about mathematical expertise is still scarce. To this end, we systematically investigated which domain-general and domain-specific cognitive abilities, as well as personality traits, are related to mathematical expertise. We compared 42 mathematicians (M) with 42 age, sex, educational level, and intelligence matched non-mathematicians (NM). Analyses were done with Bayesian statistics. Results showed that M and NM had largely similar profiles. They were comparable in working memory, visual statistical learning, and general patterning abilities; only in the patterning domain time M were better. Both groups performed equally in the approximate number system and ordinality task. However, M had a more accurate mental representation of symbolic numbers and better arithmetic fact knowledge. Similarities also emerged in Need for Cognition and the Big Five except for openness to experiences. Overall, these findings contribute to a deeper and more differentiated understanding of mathematical expertise.

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