The Cognitive Estimation Task Is Nonunitary: Evidence for Multiple Magnitude Representation Mechanisms Among Normative and ADHD College Students

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Abstract

There is a current debate on whether the cognitive system has a shared representation for all magnitudes or whether there are unique representations. To investigate this question, we used the Biber cognitive estimation task. In this task, participants were asked to provide estimates for questions such as, “How many sticks of spaghetti are in a package?” The task uses different estimation categories (e.g., time, numerical quantity, distance, and weight) to look at real-life magnitude representations. Experiment 1 assessed (N = 95) a Hebrew version of the Biber Cognitive Estimation Task and found that different estimation categories had different relations, for example, weight, time, and distance shared variance, but numerical estimation did not. We suggest that numerical estimation does not require the use of measurement in units, hence, it represents a more “pure” numerical estimation. Experiment 2 found that different factors explain individual abilities in different estimation categories. For example, numerical estimation was predicted by preverbal innate quantity understanding (approximate number sense) and working memory, whereas time estimations were supported by IQ. These results demonstrate that cognitive estimation is not a unified construct.