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Comparing comparison indices: Assessing the validity of different magnitude comparison measures across presentation formats and age groups

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Abstract: Magnitude comparison tasks are used to assess the precision of numerical representations. Recent research, however, questions the validity of different measures of magnitude comparison. We investigated the validity of five performance measures: overall RT, overall accuracy, numerical ratio effect (RT), numerical ratio effect (accuracy), and Weber fraction. Kindergarten and university students completed symbolic and non-symbolic magnitude comparison tasks and a math skill measure. For children and adults, we calculated Chronbach's α separately for each presentation format. All values were in the unacceptable range, indicating that the different indices were not measuring the same construct. For children, a multiple regression predicting KeyMath scores from symbolic and non-symbolic indices showed that only non-symbolic overall accuracy and symbolic overall RT were predictors. For adults, a multiple regression predicting French Kit scores showed that only the symbolic numerical ratio effect (RT) was a predictor. No index demonstrated predictive validity across formats or age groups.