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The Structure of Young Children's Numerical and Spatial Abilities

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Abstract: We conducted a study of 400 preschool children to determine whether spatial and numerical skills rely on common processes. Children completed a battery of mathematical tasks as part of an ongoing preschool formative assessment development project. We created theoretically meaningful skills from these tasks and carried out item response theoretic analyses on each skill. We extracted Rasch scores for each of the skills and carried out multiple factor analyses to determine whether one or more factors best characterized spatial and numerical skills. Finally, we regressed factor scores on demographic variables, including age, gender, socioeconomic status, and verbal ability. We discuss how our results add to our understanding of the connection between spatial and numerical processes and their implications for closing the achievement gap in early education.