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Individual differences in the development of children's arithmetic fluency from grades 2 to 3

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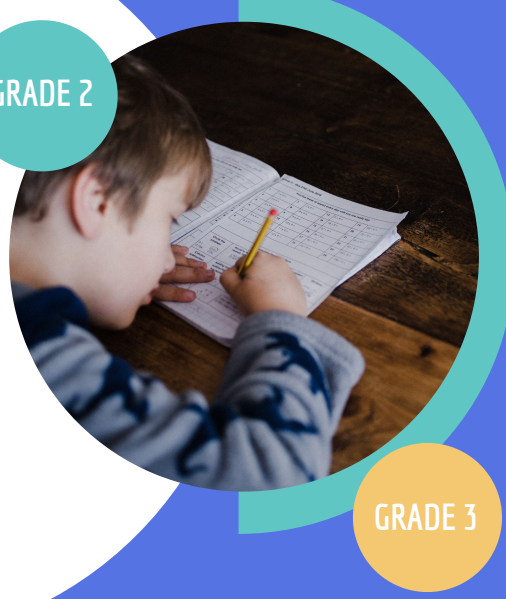
WHAT DID WE ASK?

How do the relations among symbolic number skills (i.e., addition, subtraction, multiplication) change for students from grades 2 to 3?

HOW DID WE TEST IT?

Students (***n* = 244**) completed cognitive measures (i.e., vocabulary, working memory, reasoning, and inhibitory control) in grade 2 (aged 7-8 years). In both grades 2 and 3, they also completed **addition** and **subtraction** tasks.



In **grade 3**, they completed a **multiplication** task and three measures of math knowledge, (i.e., word-problem solving, algebra, and measurement).

WHAT DID WE FIND?

Learning arithmetic is a hierarchical process.

When students practice a new math skill (i.e., multiplication), individual differences reflect the integration of the new information with their existing knowledge.

By grade 3, subtraction uniquely predicts multiplication whereas addition does not, indicating that subtraction captures the highest level of integration. Both subtraction and multiplication predict performance on the measures of math knowledge.

WHY IS THIS IMPORTANT?

Students need to have acquired strong addition and subtraction skills prior to being introduced to more advanced operations. Novel arithmetic associations should be learned in the context of existing knowledge.