

**ZMATH 2016f.01271**

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**Development of probabilistic understanding in fourth grade.**

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**Summary:** We analyzed the development of 4th-grade students' understanding of the transition from experimental relative frequencies of outcomes to theoretical probabilities with a focus on the foundational statistical concepts of variation and expectation. We report students' initial and changing expectations of the outcomes of tossing one and two coins, how they related the relative frequency from their physical and computer-simulated trials to the theoretical probability, and how they created and interpreted theoretical probability models. Findings include students' progression from an initial apparent equiprobability bias in predicting outcomes of tossing two coins through to representing the outcomes of increasing the number of trials. After observing the decreasing variation from the theoretical probability as the sample size increased, students developed a deeper understanding of the relationship between relative frequency of outcomes and theoretical probability as well as their respective associations with variation and expectation. Students' final models indicated increasing levels of probabilistic understanding.

*Classification:* K52 K42 C32

*Keywords:* expectation; probability models; relative frequency; statistical literacy; theoretical probability; variation

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