

What's Typical? Children's and Teachers' Ideas About Average

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1. Introduction

In sets of data, from the simplest to the most complex, one of the essential problems is to reduce a large, unmanageable, and disordered collection of information to summary representations that capture the essence of the data. Even in their first data collection experiences, young children begin to move from focussing on individual pieces of data ("I like chocolate ice cream best") to capturing the essence of a larger amount of data in some manageable form: *most* of the class likes chocolate ice cream best, *few* students like strawberry. As soon as the need arises to describe a set of data in a more succinct way, the need for descriptive statistics arises: What is typical of these data? How can we capture their distribution?

This study explored the guiding conceptions and misconceptions from which children and adults build their models of descriptive statistics. Unlike other empirical studies of children's conception of average, we focus on people's own constructions of the idea of average and explore the relationship between informal ideas about "typical", "representative", and "average" with formal definitions and algorithms learned in school.

Twenty-one children (seven fourth, seven sixth, and seven eighth graders) and eight teachers were interviewed, using a series of open-ended problems that examined their notions of average. Grade levels of the teachers were as follows: one fourth grade, one fifth grade, one sixth grade, two seventh grade, one eighth grade, and two were mathematics coordinators (one at the elementary and one at the middle school level). Clinical interviews provided a means of examining, extending, and probing participants' ideas in different contexts. Based on pilot work, we designed a series of seven problems (available from the authors), which included both *construction problems* and *interpretation problems*. Interpretation problems involve describing, summarising, comparing, and reasoning about given sets of data. For example, the Allowance Interpretation Problem asked students to imagine that their parents were willing to give

