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**Irma E. Stevens\*** ([istevens@uga.edu](mailto:istevens@uga.edu)), 110 Carlton St., Aderhold Hall, Athens, GA 30602. *How a Pre-Calculus Student Was Able to Reason about Rates of Change Using Magnitudes.*

Researchers have shown how reasoning about amounts of change in quantities' magnitudes is productive for constructing a graph illustrating appropriate rates of change. To reason about rates of change using amounts of change in quantities' magnitudes, a student could manipulate the length of a segment understood to represent a quantity's magnitude by increasing it by successive equal increments and additively comparing the amounts of change that occur in a second bar representing some other quantity's magnitude. Alternatively, a student could reason about the ratio of the accumulated amounts of two bars relative to one another at various lengths. Over the course of several sessions in a summer-long teaching experiment, we explored how an undergraduate student, who was studying music education and had just successfully completed a pre-calculus course, could manipulate bars representing the magnitudes of the quantities under consideration using the second approach to reason about rates of change across several graphing tasks and situations. We argue students' abilities to reason with magnitudes supports their ability to manipulate objects representing quantities' magnitudes in a way that encourages multiple ways of reasoning quantitatively about rates of change. (Received September 26, 2017)