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Caroline J. Merighi* (caroline.merighi@tufts.edu). *Introductory calculus students' approaches to conceptual problems and what it reveals about their understandings of core calculus concepts.*

Prior studies have found that even students who are successful in calculus courses can hold weak understandings of concepts that underlie the algorithms they routinely use. In this study, we investigate these ideas further by examining the written work of first-semester calculus students on problems that address the foundational concepts of rate of change and accumulation without providing explicit equations to manipulate. We also analyze videotaped data of students working on similar problems during research interviews. The interview data show that students have widely varying approaches to these types of problems. When their intuition conflicts with memorized facts and formulas from class, some students readily abandon their intuition while others trust their intuition more strongly. Only one student in this study attempted to reconcile their intuition and their knowledge from class. In addition, quantitative analysis of students' written responses reveals that despite a full semester of calculus instruction, many students claim that there is no way to interpret rate of change or accumulation from graphical data. This illustrates that students may become proficient at computing derivatives and integrals without an accompanying development of the meanings of these concepts. (Received September 24, 2017)