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Robert Ely* (ely@uidaho.edu), University of Idaho. *Student reasoning with definite integrals using infinitesimals-based notation registers.*

Recent research (e.g., Jones 2016) has shown that students in calculus classes rarely develop ways to interpret definite integral notation that help them with modeling and interpreting. Drawing on Jones' framework and Duval's (2006) semiotic theory of registers, this study describes two notational registers for definite integral notation used and studied in several experimental calculus classes: the adding up pieces (AUP) and multiplicatively-based summation (MBS) registers. These registers are situated in a broader "informal infinitesimals" approach to calculus, in which differentials like dx directly represent infinitesimal quantities instead of serving as notational finesses or vestiges of a limiting process. Student reasoning data suggests that the AUP register supports modeling and interpreting with integral notation and the MBS register supports sense-making of the relationship between accumulation and rate-of-change functions. This indicates some potential benefits of teaching calculus with informal infinitesimals rather than limits. (Received February 04, 2018)