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Stacy Marie Musgrave* (stacy.musgrave@asu.edu). *Calculus Students' Meanings for Order of Operations and Consequences for Performing Differentiation Tasks*. Preliminary report.

Many Calculus students struggle to apply rules of differentiation and integration techniques. A possible source of this difficulty is weak structure sense; namely, students rarely attend to the structure of given functions or equations even though the structure dictates which rules to apply and the order in which to use them. For instance, recognizing the function $f(x) = 3x \cos(2 - x)$ is a product of the two sub-expressions $3x$ and $\cos(2 - x)$ is the first step in finding the derivative of f analytically.

Order of Operations determine the structure of expressions. For instance, Order of Operations establish the expression $3 - 5 \times 6$ is a difference in which the minuend is 3 and the subtrahend is 5×6 . However, common treatment of Order of Operations in classroom settings supports students in developing meanings for Order of Operations limited to computation rather than as a means to parse structure.

In this talk, I discuss data collected from several tests and interviews conducted during a semester of introductory Calculus. I describe students' meanings for Order of Operations as a means to parse structure of expressions and discuss possible consequences for those meanings, particularly as they relate to performing differentiation tasks in Calculus I. (Received August 31, 2014)