1106-L1-219 **Elise Lockwood*** (elise314@gmail.com), **Craig A. Swinyard** (swinyard@up.edu) and **John S. Caughman** (caughman@pdx.edu). *What's a factorial? Insights into student reasoning about the multiplication principle.*

Although combinatorial tasks are broadly accessible and provide opportunities for deep mathematical thinking, studies indicate that students have difficulty solving such tasks correctly. While research in this field is growing, more work is needed to examine ways of thinking about combinatorial concepts that might be helpful for students. In this talk we discuss an episode that arose during a ten-session teaching experiment in which two undergraduate students successfully reinvented four basic counting formulas. While their work supported them in solving 97% of tasks correctly, our episode reveals surprising issues that arose in their ways of thinking about factorials and, more broadly, the multiplication principle. Specifically, the students did not display a robust understanding of the multiplication principle, and this appeared to constrain their fluency in reasoning about factorials. Our findings suggest that the repurposing of factorials – a concept many students first encounter in a calculus context – for use in a discrete setting could present a source of cognitive conflict for students. We explore several ways this could be further investigated in the context of the multiplication principle, and we also discuss implications for the reinvention methodology. (Received August 11, 2014)