Abstract. Over the past 20 years there have been many studies in mathematics education that have focused on students’ knowledge of functions. The concept of composition, however, has not been incorporated in these studies despite it being an essential operation of functions. Previous educational research on the chain rule has indicated that function composition is an important concept for understanding the chain rule. Because of this, the chain rule provides a useful context for studying function composition. In this talk, I will discuss first year calculus students’ routines of composition while working on chain rule tasks. The results identify several different ways that students treat composition across different types of functions. This provides valuable information to aid calculus instructors in supporting student understanding.