

What Would You Say You Do Here?
Metaphor as a Tool to Characterize Mathematical Practice

Joseph Olsen, Kristen Amman
Rutgers University

Kristen Lew
Texas State University

In the cognitive science literature, multiple researchers have pointed out the importance of metaphor as a cognitive mechanism for sense-making. In mathematics in particular, metaphor has been shown to be a valuable tool in making sense of and reasoning with mathematics. To our knowledge, there has been no research on the metaphors that professors use when communicating the nature of mathematical practice to students in advanced mathematics lectures. In this poster, we describe the metaphors the research team identified across 11 undergraduate mathematics lectures at the advanced level. We found metaphors used by many lecturers that convey ideas about the nature of mathematical practice. We identified the affordances of these metaphors to better understand the way that mathematicians describe mathematics as a practice to undergraduate students studying advanced mathematics at the undergraduate level.

Keywords: Metaphor, Mathematics education, Advanced mathematics

In the language used in everyday thought and speech, there are large number of expressions whose literal interpretations suggest something other than the intended meaning (Lakoff & Johnson, 1980/2003; Reddy, 1979). In documenting occurrences of these expressions and analyzing their content, researchers have developed the modern theory of metaphor, which has been applied across many disciplines to analyze how we as a species make sense of the world and develop our ideas (Lakoff & Johnson, 2003/1980). In mathematics, it has been argued that metaphors form the foundation of sense making and that we can analyze many important mathematical concepts to identify their metaphorical foundations (Lakoff, 1998; Lakoff & Nuñez, 2000; Nuñez, Edwards, & Matos, 1999; Sfard, 1994)

As the theory of metaphor has developed in a mathematical context, there has been some research documenting the metaphors that mathematicians use to personally make sense of and reason about mathematics (Nathalie & Tabaghi, 2010; Sfard, 1994). Many different types of metaphors have been documented, such as those relying on our conceptions of motion and our experiences with manipulating physical objects (Lakoff & Nuñez, 2000; Nuñez, 2004). Nuñez (2004) found occurrences of motion metaphors in an advanced mathematics lecture.

Through the study of metaphors, we answer the question “How do mathematicians describe their practice to advanced undergraduate students?” To answer this question, we analyzed a corpus of 11 undergraduate mathematics lectures at the advanced level. We found several metaphors that characterize the practice of mathematics (e.g. mathematics as play “*You have to play around slightly and get three disjoint sets*”, mathematics as a journey “*We have some loose ends in the theory that we won’t be able to deal with until we get to a more advanced place*”). We analyzed the metaphors we found and describe the entailments of these metaphors. Through this lens, we can describe the ways that mathematicians convey the practice of their discipline to students. We may also use this analytical tool as a method of understanding how students conceptualize mathematics.

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