

# Reasoning About Equations with Tape Diagrams: Do Differing Visual Features Matter?

**Anna Bartel**

University of Wisconsin- Madison, Madison, Wisconsin, United States

**Elena Silla**

University of Wisconsin-Madison, Madison, Wisconsin, United States

**Nicholas Vest**

University of Wisconsin- Madison, Madison, Wisconsin, United States

**Tomohiro Nagashima**

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

**Vincent Alevan**

Carnegie Mellon University, Pittsburgh, Pennsylvania, United States

**Martha Alibali**

University of Wisconsin-Madison, Madison, Wisconsin, United States

## Abstract

Diagrams are a potentially valuable tool for helping students understand mathematical concepts and procedures. One type of diagram that is sometimes used to depict mathematical relationships is tape diagrams, which depict quantities in continuous strips. This study investigated whether tape diagrams with different visual features differentially support reasoning about equations, and explored whether people have preferences for tape diagrams with different visual features. Undergraduates ( $N = 50$ ) were asked (1) to generate equations to correspond with tape diagrams with varying visual features, and (2) to select the diagram they preferred from pairs that differed in visual features. Variations in visual features (color, presence of outer lines, and position of the constant) did not affect participants success at generating equations to correspond to the tape diagrams. However, participants displayed systematic preferences for most visual features considered. Future research should examine the effects of these visual features on performance while solving equations.