

Abstract Submitted  
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**Conceptual blending, identity, and the 2-d rotation matrix**

HUNTER CLOSE, Texas State University — We expect our upper-division physics students to move flexibly between multiple interpretations and representations of mathematics while doing physics. In conceptual blending theory, the human mind fuses two mental spaces into a blend; in this blend, various vital relations compress to allow the mind to achieve new insight by thinking within the blended space. One vital relation that is fundamental to blending is “identity,” through which two cognitive elements become linked. Eigenvalue problems in quantum mechanics invoke the identity idea when we conceive of an operator as transforming a state into another that is “the same, except for” a scalar factor. Similarly, a matrix can be understood as having eigenvectors that it leaves “unchanged, except for” a scalar factor. The 2-d rotation matrix and its eigenvalue problem offers an interesting arena for investigating the identity relation in student thinking. This talk outlines a design for an observational study using teaching experiments to understand how students manage the identity relation, including their ability to flexibly reassign the identity relation, and whether this ability is associated with any other measures of success in interpreting the eigenvalue problem for the 2-d rotation matrix.

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