

TENTATIVENESS AS A STRATEGY AND AFFORDANCE IN PROBLEM SOLVING

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Spatial reasoning has been identified as integral to both general mathematical capability and the potential for individuals to flourish in life beyond formal mathematics education. Specifically, the ability to *visualize* shape and space is an aspect of spatial reasoning that is consistently associated with achievement in mathematics (Davis et al., 2015).

This research studies how spatial reasoning skills are enacted by secondary students as they work on other topics in mathematics, such as algebra. The study is guided by a theoretical frame of enactivism, in which cognition is viewed as a complex phenomenon emerging out of the interaction between an organism and the environment (Reid & Mgombelo, 2015).

Data was generated in two secondary classes with a total of 36 participants at a large, western Canadian high school. The classes covered topics in pre-calculus and calculus and were part of the school's International Baccalaureate program. All participants had high academic achievement in mathematics. Lessons were designed to elicit embodied and spatial approaches to problem solving (e.g., using origami to solve problems involving quadratic functions) and were video recorded.

Through an analysis of video and written work, I identify and describe a distinctive feature of classroom interaction, which I refer to as *tentativeness*. As a strategy employed by students, I show tentativeness to be an emergent, participatory quality of problem solving and posing. As a phenomenon to which students respond, I show it as an affordance that broadens the possibility for adaptive action in the classroom.

While tentativeness is often framed as a deficit, synonymous with indecision, I characterize it as an emergent process arising between the student, the problem, and the environment. Knowing more about how to structure it in the classroom and elicit it from students has important implications for students' mathematical understanding.

References

- Davis, B., & The Spatial Reasoning Study Group (2015). *Spatial reasoning in the early years: Principles, assertions, and speculations*. Routledge.
- Reid, D. A., & Mgombelo, J. (2015). Survey of key concepts in enactivist theory and methodology. *ZDM-The International Journal of Mathematics Education*, 47(2), 171-183.