**Texas State University Department of Mathematics Colloquium** Friday, March 4, 2022 Time/location tba

## Modeling a Relationship Between Students' Covariational Reasoning and their Graph Selection



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*Abstract:* I address a problem being taken up by a growing number of mathematics education scholars: How to scale up results from interview-based studies investigating students' mathematical reasoning? Together with the project team, I led the development of a six-item, fully-online assessment of students' covariational reasoning, that students can access on computers, tablets, or mobile phones. Students are to view a video of a situation, select a graph that represents a relationship between variables, and explain their graph choice. I discuss results from a pilot study, in which our team analyzed the responses of 109 undergraduate college algebra students. Employing a mixed methods approach, our team qualitatively coded students' written explanations, then quantitized those codes to examine connections between students' reasoning and their graph selection. Our team then used structural equation modeling to explore a predictive relationship between the latent variables of student reasoning and graph selection. Our data fit the model well; the pathway's standardized regression weight was 0.75 (p < 0.001), indicating that the student reasoning variable is explaining 56% of the graph selection variable. Furthermore, we found that students whose written explanations evidenced covariational reasoning were more likely to select graphs that accurately represented given relationships between variables. While our team is excited by our findings, we acknowledge that 56% is only part of the story. I share thoughts regarding how we might explain the additional variation, and conclude with implications for research and practice.

