The structure of the concept image:
Analyzing students’ representation and use of mathematical properties

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Abstract:
The transition from less formal reasoning processes to formal-axiomatic processes of understanding is fundamentally different than earlier transitions students must face. This requires a substantial shift in the students’ thinking—from descriptive activities concerning the properties of mathematical objects, to defining activities that construct new mathematical objects from collections of their assigned properties. Therefore, the dual processes of abstraction and instantiation of mathematical properties will play an essential role in the development of formal-axiomatic knowledge structures.

This talk will report on an ongoing investigation into the forms of abstraction and instantiation of mathematical properties used by undergraduate topology students as they act to understand and use the concept of a continuous function, defined axiomatically. Task-based interviews are currently underway to infer participants’ representation and use of mathematical properties, as well as the types of abstraction they employ, when constructing their new understanding of continuous functions and related concepts.

Dan Cheshire is a doctoral student at Texas State University. His research interests include investigating students’ transition to abstract mathematical understanding, especially in the introduction to generalized metric and topological spaces.