

1112-03-600

Wesley C Calvert* (wcalvert@siu.edu), Department of Mathematics, Mail Code 4408, 1245 Lincoln Drive, Southern Illinois University, Carbondale, IL 62901, and **Vina Castelli**. *What could we be, if not rational?* Preliminary report.

Mathematicians determine truth by finding deductive proofs from some appropriate axiomatic system — perhaps ZFC, or PA. This is emphatically not how people think. The fact that people are rational does not prevent logicians from modeling their thought.

Indeed, the study of “mental models” seems to invite logical analysis. People empirically seem to start with axioms, construct models of those axioms, and reason by checking truth in these models. Many parts of this are beyond the logical, but it is altogether consistent with logical practice to explore how an incomplete theory controls its family of models.

The recent master’s thesis of Vina Castelli suggests how this might be done. Castelli demonstrated an essential increment in cognitive load for elementary students to learn division with remainder by showing that it is not provably possible in a weak fragment of first-order arithmetic that does appear to prove most things that students learn earlier. The present, largely speculative talk, will suggest how work like Castelli’s might allow logicians to explain well-known empirical observations in cognition. (Received August 11, 2015)