Mental representations and processing of radical expressions

Purav Patel
University of Minnesota - Twin Cities

Sashank Varma
University of Minnesota - Twin Cities

Abstract: Mathematical cognition researchers have studied the mental representations of natural numbers, integers, and fractions extensively. We investigated the representations of irrational and perfect square numbers in a laboratory setting. Eighty participants performed (1) a magnitude comparison task (MC) by indicating which of two numbers is greater or lesser, (2) a number line estimation task (NLE) that required subjects to estimate the positions of natural and radical numbers on a number line, and (3) a numeracy test. On the MC task, participants were slower for radical expressions than for natural numbers and showed distance and size effects for both. When comparing radical expressions, they were faster when both numbers were perfect squares. This suggests a privileged mental representation for perfect squares. On the NLE task, participants were less accurate when locating radical expressions. Performance on the numeracy test revealed broad deficits in conceptual and procedural knowledge of irrational numbers.