

COMPUTER SCIENCE
SEMINAR

*Visual Thinking in Autism, Psychometrics, and AI: The Case
of the Raven's Progressive Matrices Test*

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Abstract: How do humans perform high-level reasoning and problem solving? Much of cognitive science research and almost all of AI research into problem solving has focused on the use of verbal or amodal propositional representations, despite the growth of evidence from neuroscience showing that many mental representations function as modal perceptual symbols. In this talk, I will discuss the role of iconic mental representations in high-level problem-solving tasks. I will first examine the notion of whether certain individuals with autism may have a bias towards "thinking visually." I will then focus on one problem-solving domain in particular: the Raven's Progressive Matrices test, which represents one of the single best psychometric measures of general intelligence that has yet been developed. I will describe previous computational theories of problem solving on the Raven's test, which have all been propositional in nature, and then present a new computational model, the ASTI model, which uses purely visual operations akin to those used in mental imagery. I will end by discussing implications of the model for our evolving understanding of cognition in autism, general human cognition, and computational views of intelligence.

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