Perceptual Learning in Mathematics Produces Durable Encoding Improvements

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Abstract: Mathematical competence requires pattern recognition for appropriate application of concepts and procedures. Research demonstrates that interventions targeting perceptual learning (PL) improve math performance. Little research, however, has directly investigated encoding changes, measured psychophysically, that may accompany PL gains in real-world tasks. We sought evidence of lasting encoding changes for mathematical objects for participants who used an Algebraic Transformations PLM and compared them to a Control group who did a different task, one that did not target PL of equation structure, but provided equal exposure to the same equations as in the PLM. All participants completed a speeded same/different psychophysical task comparing equations at pretest and delayed posttest. The PLM group improved on the psychophysical task more than controls, demonstrating that PLM structure, not mere exposure to equations, caused the information encoding gains. Perceptual learning interventions can accelerate expertise in complex domains, and these learning gains produce detectable, durable encoding changes.