Visualizing Cross Sections: Training Spatial Thinking Using Interactive Animations

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Abstract: Three experiments investigated the use of interactive animation and virtual models to train a spatial visualization skill, the ability to represent the two-dimensional cross section of a three-dimensional object. Trained participants significantly outperformed controls and showed limited transfer to untrained stimuli. Results were interpreted with respect to three theoretical accounts of improvement after training. Instance-based accounts attribute performance gains to a larger store of memories and predict no transfer to new stimuli or spatial processes. Process-based accounts attribute gains to increased efficiency of mental processes and predict general transfer to new stimuli and tasks sharing the same processes. Intuition-based accounts characterize learning as the accumulation of specific perceptual experiences and predict limited transfer. Performance gains and patterns of transfer were most consistent with intuition-based theory. The results suggest that interactive animation is an effective medium for training spatial visualization skills, particularly when supplemented with verbal instruction and physical models.