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Visual alignment promotes rapid learning of functional relations

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Abstract

Learning a function from input-output pairs often follows exemplar or rule learning. Speed of exemplar learning and generality of rule learning were suggested to be promoted by visually aligning familiar and unfamiliar input-output exemplars. To test this, undergraduates (n=47) were randomly assigned to Full-, Partial- and No-Alignment groups. On each trial, students estimated fractions on number lines, and functions used to generate estimates were examined on 9 trial blocks. On pretest, estimates were (incorrectly) a linear function of denominators alone (Full 50%; Partial 50%; No 40%); on post-test, estimates were (correctly) a linear function of the whole fraction (88%; 44%; 47%). Virtually all change in the Full group occurred after training just two exemplars (75%). Also, regression to the denominator-only function differed across groups (0%; 38%; 33%). Finally, Full-Alignment group generalized to untrained problems more broadly than other groups. Findings demonstrated efficiency of visual alignment in function learning.