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# Plasticity, gender, and the environment during numerical and spatial development

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## Abstract

Cognitive scientists continue to debate gender/sex differences and similarities in basic problem-solving, including numerical and spatial cognition. While gender group differences may exist in these cognitive skills adulthood, it is unclear whether differences are fixed (early-developing, permanent) or plastic (late-developing, malleable). If fixed, they would relate more to gender categories; if plastic, they would relate more to gender socialization and spatial learning environment. To disentangle these hypotheses, we measured brain activity with fMRI in 51 children (4-8y; 20 boys / 31 girls) during numerical (vs. face) and geometric (vs. word) processing tasks. Activity occurred in bilateral superior and inferior parietal cortex during numerical and geometric processing, but activity within these regions was unrelated to gender category, gender socialization, or spatial learning environment. Bayesian analyses also revealed widespread gender similarities in numerical and geometric processing. These findings challenge the hypothesis of early, fixed gender differences in numerical and spatial development.