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Authors: Marie Amalric, Isabelle Denghien, Stanislas Dehaene



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# On the role of visual experience in mathematical development: Evidence from blind mathematicians

**Authors:** Marie Amalric<sup>1-3,\*</sup>, Isabelle Denghien<sup>1</sup> and Stanislas Dehaene<sup>1-2,\*</sup>

## Affiliations

<sup>1</sup> Cognitive Neuroimaging Unit, CEA DSV/I2BM, INSERM, Université Paris-Sud, Université Paris-Saclay, NeuroSpin center, 91191 Gif/Yvette, France

<sup>2</sup> Collège de France, Paris, France

<sup>3</sup> Sorbonne Universités, UPMC Univ Paris 06, IFD, 4 place Jussieu, Paris, France

\*Correspondence to: [marie.amalric@cea.fr](mailto:marie.amalric@cea.fr) or [stanislas.dehaene@cea.fr](mailto:stanislas.dehaene@cea.fr)

## Abstract

Advanced mathematical reasoning, regardless of domain or difficulty, activates a reproducible set of bilateral brain areas including intraparietal, inferior temporal and dorsal prefrontal cortex. The respective roles of genetics, experience and education in the development of this math-responsive network, however, remain unresolved. Here, we investigate the role of visual experience by studying the exceptional case of three professional mathematicians who were blind from birth ( $n=1$ ) or became blind during childhood ( $n=2$ ). Subjects were scanned with fMRI while they judged the truth value of spoken mathematical and nonmathematical statements. Blind mathematicians activated the classical network of math-related areas during mathematical reflection, similar to that found in a group of sighted professional mathematicians. Thus, brain networks for advanced mathematical reasoning can develop in the absence of visual experience. Additional activations were found in occipital cortex, even in

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