

## Accepted Manuscript

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

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PII: S1878-9293(16)30220-1  
DOI: <https://doi.org/10.1016/j.dcn.2017.09.007>  
Reference: DCN 494

To appear in:

Received date: 1-11-2016  
Revised date: 22-9-2017  
Accepted date: 22-9-2017

Please cite this article as: Amalric, Marie, Denghien, Isabelle, Dehaene, Stanislas, On the role of visual experience in mathematical development: Evidence from blind mathematicians. *Developmental Cognitive Neuroscience* <https://doi.org/10.1016/j.dcn.2017.09.007>

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

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## 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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