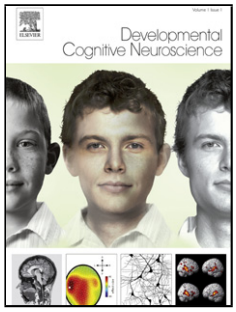

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PII: S1878-9293(16)30240-7
DOI: http://dx.doi.org/doi:10.1016/j.dcn.2017.03.005
Reference: DCN 442

To appear in:

Received date: 8-12-2016
Revised date: 23-2-2017
Accepted date: 16-3-2017

Please cite this article as: Michels, Lars, O'Gorman, Ruth, Kucian, Karin, Functional hyperconnectivity vanishes in children with developmental dyscalculia after numerical intervention.Developmental Cognitive Neuroscience http://dx.doi.org/10.1016/j.dcn.2017.03.005

Functional hyperconnectivity vanishes in children with developmental dyscalculia after numerical intervention

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Abstract

Developmental dyscalculia (DD) is a developmental learning disability associated with deficits in processing numerical and mathematical information. Although behavioural training can reduce these deficits, it is unclear which neuronal resources show a functional reorganization due to training. We examined typically developing (TD) children (N = 16, mean age: 9.5 years) and age-, gender-, and handedness-matched children with DD (N = 15, mean age: 9.5 years) during the performance of a numerical order task with fMRI and functional connectivity before and after 5-weeks of number line training. Using the intraparietal sulcus (IPS) as seed region, DD showed hyperconnectivity in parietal, frontal, visual, and temporal regions before the training controlling for age and IQ. Hyperconnectivity disappeared after training, whereas math abilities improved. Multivariate classification analysis of task-related fMRI data corroborated the connectivity results as the same group of TD could be discriminated from DD before but not after number line training (86.4 *vs.* 38.9%, respectively). Our results indicate that abnormally high functional connectivity in DD can be normalized on the neuronal level by intensive number line training. As functional connectivity in DD was indistinguishable to TD's