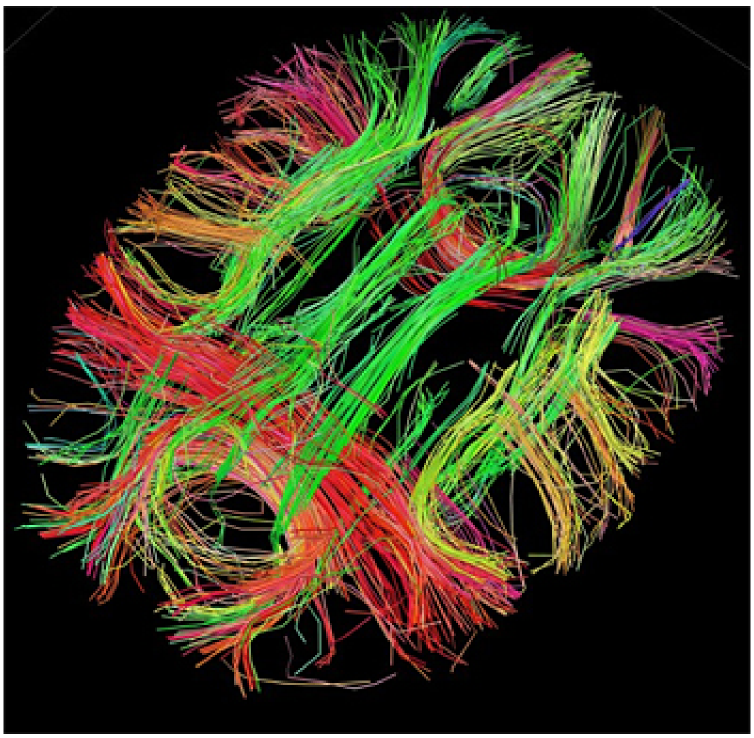
How communication among neurons changes over the course of development

February 5 2015



White matter fiber architecture of the brain. Credit: Human Connectome Project.

Using multiphoton imaging, scientists are now able to move beyond characterizing the properties of individual cells to investigate how communication among neurons changes over the course of development. In their paper published in *Nature Neuroscience*, researchers at Max Planck Florida Institute for Neuroscience and Frankfurt Institute for

Advanced Studies report substantial developmental changes in communication among cells that significantly improve the information processing capabilities of the brain.

Previous work, including studies performed in the Fitzpatrick Lab at the Max Planck Florida Institute for Neuroscience has shown that individual brain cells refine their responses to stimuli with experience so they can better discriminate between similar features in their environments.

However, the signals of individual brain cells can be noisy and imprecise - which means our brains cannot rely solely on the activity of single neurons to make accurate decisions about our world. Instead, we combine the activity of thousands to millions of neurons to ensure a more accurate message, which makes effective communication amongst large populations of neurons a central feature of the brain.

The researchers' study demonstrates that, over development, neural circuits reorganize themselves to decrease noise and improve the fidelity of communication amongst each other. The critical role these changes play in brain development highlights the importance and urgency in understanding neural circuits in more detail and suggests new avenues for investigating the underlying causes of developmental disorders such as autism.

The authors of the study said the key question moving forward is to understand what specific changes in brain circuitry give rise to the effects observed in this study. Where do these changes manifest themselves within the circuit and what molecular processes do they utilize? We know that a number of structural changes also occur during this developmental period, and we now can attempt to link those changes to the changes in circuit function.

More information: "The development of cortical circuits for motion discrimination." *Nature Neuroscience*, 2015; 18 (2): 252 DOI: 10.1038/nn.3921

Provided by Max Planck Society

Citation: How communication among neurons changes over the course of development (2015, February 5) retrieved 27 April 2024 from https://medicalxpress.com/news/2015-02-neurons.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.