

## How neurons reorganize in growing brains

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[Matthias Kaschube](#) of Princeton University and his collaborators have applied concepts from pattern formation and continuum dynamics to address a key question in neuroscience: Do neurons retain their roles in a growing brain? Although an adult human's brain is four times as large as a baby human's, it has roughly the same number of neurons. The extra volume accommodates the developed brain's greater number of blood vessels, nonneuronal cells, and—crucially for memory and intelligence—interneuron connections. To understand the development of those connections, Kaschube and others study ocular dominance (the brain's preference for input from one eye over the other) in the primary visual cortex (the brain's principal image processor). Several factors make OD a convenient model system. Not only are OD signals readily induced and tracked; the neurons responsible for OD are grouped in recognizable rows of columns. Data gathered from kittens by Kaschube's collaborators—Karl-Friedrich Schmidt and Siegrid Löwel of Friedrich Schiller University in Jena, Germany—conflict with the simplest growth model in which OD columns and their separations both expand by the same factor as the visual cortex. Rather, the columns increase in number and keep their separations while the rows lose their original straight configuration and become wavier. Kaschube and his graduate student Wolfgang Keil account for the pattern change by invoking the zigzag instability, which arises when stripes in isotropic systems are stretched. In the simple growth model, individual OD neurons would continue to carry signals from the same part of the visual field of view to the same part of the visual cortex. In Kaschube and Keil's model, the reorganization of OD neurons implies that individual neurons continuously and flexibly change their signal-carrying roles. (W. Keil, K.-F. Schmidt, S. Löwel, M. Kaschube, [Proc. Natl. Acad. Sci. USA, in press.](#))—Charles Day

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