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PEOPLE

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- Staff
- Researchers
- Postdocs
- Graduate Students
- Undergrad Students

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GIVING

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SEARCH

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Our lab investigates the functional organization of the brain as a window into the architecture of the human mind. In the past our lab has discovered a number of cortical regions that are stunningly specialized for specific cognitive tasks such as the perception of faces, places, bodies, and words. Current work is attempting to better characterize the function of each of these regions, to test long-standing but unresolved claims of other cortical specializations (e.g., for language), and to search for new unpredicted specializations using novel clustering methods (in collaboration with Polina Golland). More generally, we want to know which mental functions get their own specialized piece of cortical territory and why we have cortical regions specialized for some mental functions, but apparently not others.

A major goal of our current research is to understand how functionally specific cortical regions arise in development, and whether and how they change in adulthood. We have demonstrated important roles for experience by showing i) changes in the cortical representation of objects after training, ii) the existence of a cortical region whose specialization (for visual word perception) must be based on experience, and iii) changes in the response of retinotopic cortex in people with loss of foveal vision due to macular degeneration. On the other hand, exciting recent work from other labs suggests an important role for genes in determining cortical specialization. In a new line of work funded by the Ellison Medical Foundation, we are now beginning longitudinal studies of brain and behavior in typical children and children with autism aged 5-10 (in collaboration with Saxe, Gabrieli, and our colleagues Fischl and Wald who are developing new methods that will revolutionize pediatric neuroimaging). A central puzzle in this work is why the cortex continues to change into the teenage years even when the relevant underlying cognitive functions appear to be in place by age four.

Other lines of work in our lab explore the nature of the representations that enable us to recognize faces, objects, words, and scenes and that underlie our conscious experience of the visual world, the neural representation of visual

arrays of multiple objects, the perceptual/cognitive functions that persist during diminished states of consciousness, and the role of feedback to retinotopic cortex in visual information processing.

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Additional Publications

Research Figures

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