Title: Linking computation and neurobiology in control of reaching

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Abstract: The ability to make rapid, accurate movements is critical for survival and is a key function of the mammalian brain. My lab aims to understand how mammalian cortex generates motor commands, at two levels. First, we wish to identify the computations that convert a high-level representation of a motor goal into coordinated, precisely timed commands to the muscles. Using data from reaching monkeys, we demonstrate a new way of understanding the neural dynamics that perform this command generation. Second, we wish to understand how the diversity of cell types and connectivity in neural circuits supports these computations. To approach this problem, much greater biological access is required. We therefore use calcium imaging to record from large numbers of neurons in reaching mice. We show that mouse cortex reflects fine details of arm, paw and digit movements that were not previously known, in a system where we can identify or perturb specific neurons based on their genetic profile or projection target. Together, these approaches lay a path for closer ties between the theory and biology of mammalian motor control.

Short Biography: Dr. Kaufman is an Assistant Professor at the University of Chicago in the department of Organismal Biology and Anatomy and in the Neuroscience Institute. His lab combines complex behaviors, calcium imaging, and optogenetics in mice, together with innovation in analysis and theory, to understand how neural circuits implement the computations needed for motor control and decision making. His PhD work in Krishna Shenoy's lab at Stanford used a dynamical systems approach to understand motor control in monkeys, while his postdoc with Anne Churchland at Cold Spring Harbor Laboratory brought population-level analysis to rodent decision making. He is a Sloan Fellow and the UChicago Biological Sciences Distinguished Leader in Diversity and Inclusion. His work has been funded by NIH, NSF, the Whitehall Foundation, and the Simons Foundation.

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