Gouki Okazawa

Institute of Neuroscience, Chinese Academy of Sciences

https://www.g-okazawa-lab.net/

okazawa@ion.ac.cn

Talk Title:

Behavioral mechanisms and neural geometry
for context-dependent decision making

Abstract:

To survive in diverse environments, we must accurately recognize external objects and make appropriate decisions to respond to them in a context-dependent manner. Past studies on decision making mostly used simplified sensory stimuli such as moving random dots. My goal is to understand how the brain transforms complex visual object information into action plans from the perspective of decision-making theories. In this talk, I present two discoveries that deviate from past theories developed using simplified stimuli. First, we recorded from an oculomotor area (LIP) while monkeys reported face category through eye movements. We found that neural activity reflects decision formation, but the patterns differ drastically from the evidence-accumulation signals reported previously in motion discrimination. The activity forms a non-linear population manifold that rotates across tasks, suggesting context-dependent mechanisms. Second, we found that changing task context behaviorally affects the accumulation of evidence during object categorization. When human observers switch between two categorization rules for the same face images, there is a brief reduction in evidence accumulation that recovers only after a few hundred milliseconds from stimulus presentation. The findings suggest an extension of existing context-dependent network models. Together, I argue that studying object recognition through the lens of decision making provides rich insights into underlying neural mechanisms that cannot be extrapolated from simpler perceptual tasks.

Biographical Information:

I received my B.S. from Kyoto University in 2008 and my Ph. D. from Graduate University for Advanced Studies, Japan, in 2013. During my Ph.D., I investigated the neural mechanisms of visual perception of objects and textures in macaque monkeys under the supervision of Dr. Hidehiko Komatsu. I moved to the U.S. in 2015 and did a postdoc at New York University, where I studied the neural mechanisms of perceptual decision making with Dr. Roozbeh Kiani. In 2021, I joined Institute of Neuroscience as a principal investigator in Laboratory of

Perception and Decision making.