Department of Biomedical Sciences

presents a seminar

"Dynamic representation of 3D auditory space in the midbrain of the free-flying echolocating bat"

Prof. Cynthia F. Moss
Johns Hopkins University
Baltimore, Maryland, USA

Date : 31 July 2017

Time: 11:00am to 12:30pm

Venue: Meeting Room 2-130, 1/F, Block 2, To Yuen Building

Abstract

Essential to spatial orientation in the natural environment is dynamic representation of direction and distance to objects. Despite the importance of 3D sensory coding to parse objects in a natural scene and to guide movement, most neurophysiological investigations of this problem have been limited to studies of restrained subjects, tested with 2D, artificial stimuli. Here, we show for the first time that sensory neurons in the midbrain superior colliculus (SC) of the free-flying echolocating bat encode 3D egocentric space, and that the bat's inspection of objects in the physical environment sharpens tuning of single neurons, and shifts peak responses to represent closer distances. These findings emerged from wireless neural recordings in free-flying bats, in combination with a physics-based echo model that computes the animal's instantaneous stimulus space. Our research has yielded a transformative demonstration of dynamic 3D space coding in a freely moving mammal engaged in a real-world navigation task.

About the Speaker

Cynthia F. Moss is a Professor in Psychological and Brain Sciences and Neuroscience at the Johns Hopkins University. She received a B.S. (*summa cum laude*) from the University of Massachusetts, Amherst in 1979 and a Ph.D. from Brown University in 1986. She was a Postdoctoral Fellow at the University of Tübingen (1985-1987), supported by NATO and AAUW Postdoctoral Fellowships, and a Research Fellow at Brown University (1987-1989) before accepting a faculty appointment at Harvard University, beginning in 1989. At Harvard, Dr. Moss received the Phi Beta Kappa teaching award (1992) and was named the Morris Kahn Associate Professor (1994). In 1995, Dr. Moss moved to the University of Maryland, where she was a Professor in the Department of Psychology and Institute for Systems Research until 2014.

Moss and her research group investigate the mechanisms of spatial perception, attention, learning and memory, systems used by organisms to direct their actions and navigate in the natural environment. Empirical studies in the lab exploit an animal model that provides explicit information about the signals it uses to guide behavior through an active sensing system. This animal model, the echolocating bat, coordinates its production of sonar signals with flight maneuvers in response to dynamic echo information, and exhibits a rich display of natural sensory-guided behaviors. Recent work focuses on dynamic neural activity patterns in the midbrain of the bat in the context of natural behaviors.

Enquiry:
Prof. Jufang He (3442-7042, jufanghe@cityu.edu.hk)
Mr. Edward Lau (3442-5901, eduarlau@cityu.edu.hk)
Miss Janice Leung (3442-4902, janice.leung@cityu.edu.hk)

All are welcome!