Zenith

INTERNATIONAL PHD PROGRAM IN NEUROSCIENCE

In collaboration with SmartNets

ZENITH SEMINARS

WEDNESDAY, 9 FEBRUARY 2022
AT 10:00 AM (CET)

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CRACKING THE VISUAL MOTION PROCESSING CIRCUIT USING OPTICAL ILLUSION

Direction-selective (DS) neurons compute the direction of motion in a visual scene. The exact neuronal population that causally drives motion-dependent behaviors remains largely unknown. To identify the behaviorally relevant population of DS neurons, we employed a classical optical illusion, a motion aftereffect (MAE), which causes the well-known “waterfall illusion”. Together with region-specific optogenetic manipulations and cellular-resolution volumetric calcium imaging, we found that MAE-responsive neurons represented merely a fraction of the entire population of DS cells in larval zebrafish. These MAE-responsive neurons were spatially clustered in a nucleus in the ventral lateral pretectal area. Laser ablation of the MAE-responsive cells abolished the optokinetic eye movements, whereas optogenetic activation of them drove the entire cycle of optokinetic eye movements in the absence of the visual stimulus. Thus, our illusion-based behavioral paradigm, combined with the cellular resolution calcium imaging and optogenetics, identified key circuit elements of global motion processing in the vertebrate brain.

Fumi Kubo studied Biology at the Kyoto University, Japan, and received a PhD from the same University with Masatoshi Takeichi and Shinichi Nakagawa as supervisors. She pursued her post-doctoral studies in Nakagawa’s lab, and then at the University of California, San Francisco, and at the Max Planck Institute of Neurobiology (MPIN), Germany, at Herwig Baier’s lab. She was a project leader at MPIN and since 2018 she has been appointed Associate Professor at the National Institute of Genetics in Japan where she leads research on Visual system and behavior in zebrafish.

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