Department of Psychology
The University of Hong Kong
香港大學心理學系

Brown Bag Lunchtime Seminar
(Theme: Cognition and Neuroscience)

The Neurochemistry of Learning-driven Sensory Eye Dominance Plasticity in Adults

12:30 p.m. – 1:30 p.m. │ September 22, 2023 (Friday)
Rm 813, 8/F, The Jockey Club Tower │ Centennial Campus │ The University of Hong Kong

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Abstract

Sensory eye dominance (SED) refers to the functional asymmetry of the two eyes resulting from the visual cortex weighing one eye's input more heavily than that of the other. While an exaggerated degree of SED is a prominent characteristic exhibited by certain clinical populations, a mild imbalance is commonly observed in the visually normal population. Promisingly, perceptual training protocols employing dichoptic presentation of signal-noise motion stimuli have been shown to effectively improve SED in visually normal individuals, with behavioural changes accompanying alterations of neural responses in the primary visual cortex. However, the mechanisms underlying these learning-driven neural changes are not fully understood. Here, using magnetic resonance spectroscopy, we sought to determine the role of inhibitory mechanisms in governing sensory eye balance and its plasticity in individuals with normal vision. Specifically, we measured changes in metabolic concentrations of γ-aminobutyric acid (GABA) in the occipito-temporal cortex (OTC) and motor cortex (as a control), before and after a five-day perceptual training protocol. Fifty visually normal observers received training on a dichoptic or binocular variant of a signal-in-noise (left–right) motion discrimination task over five consecutive days. Results showed significant shifts in SED following dichoptic (but not binocular) perceptual training. Before perceptual training, GABA concentrations in the OTC varied depending on the eye that received signals for both training groups. Specifically, GABA concentrations in the OTC were lower when signals were presented to the dominant eye than when signals were presented to the non-dominant eye. After dichoptic (but not binocular) perceptual training, GABA concentrations in the OTC increased during presentations of signals to the dominant eye and decreased during presentations of signals to the non-dominant eye. The observed associations between GABA and SED were specific to OTC, as GABA levels in the motor cortex remained comparable irrespective of which eye received signals and did not change with either type of training. Our data suggest that a noise-based dichoptic training protocol drives changes in SED by potentially promoting a rebalancing of interocular inhibition in the OTC.

About the speaker

KY is a final year PhD student under the supervision of Dr. Dorita Chang.

Zoom (For participants who couldn't attend the Seminar in person)

https://hku.zoom.us/j/3951550048?pwd=SncvL3RYakEycUtpL29vdDJEdlEwdz09
Meeting ID: 395 155 0048 │ Password: psyc

~All are Welcome~

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