

Title: Asymmetric Modulation of Auditory-Responsive Subpopulations in the Mediodorsal Thalamus by the Prefrontal Cortex

Hongyang Zhang¹, Zijie Li², Xuejiao Wang², Jingyu Chen², Fangxiao Liu³, Zhengxiu Li⁴, Ling Qin^{5*}, Yan Wang^{1*}.

¹Department of Otorhinolaryngology, The First Hospital of China Medical University, Shenyang, Liaoning 110001, People's Republic of China.

²Department of Physiology, School of Life Sciences, China Medical University, Shenyang, Liaoning 110122, People's Republic of China.

³Liaoning University of Traditional Chinese Medicine, Shenyang, Liaoning 110847, People's Republic of China.

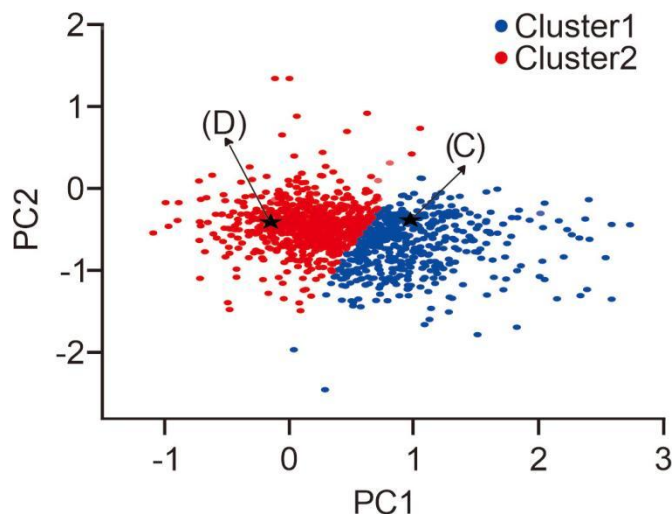
⁴Department of Dermatology, The First Hospital of China Medical University, Shenyang, Liaoning 110001, People's Republic of China.

⁵Laboratory of Hearing Research, School of Life Sciences, China Medical University, Shenyang, Liaoning 110122, People's Republic of China.

*Corresponding author: Ling Qin, Yan Wang.

E-mail: 20081029@cmu.edu.cn ; wangyanoto@cmu.edu.cn

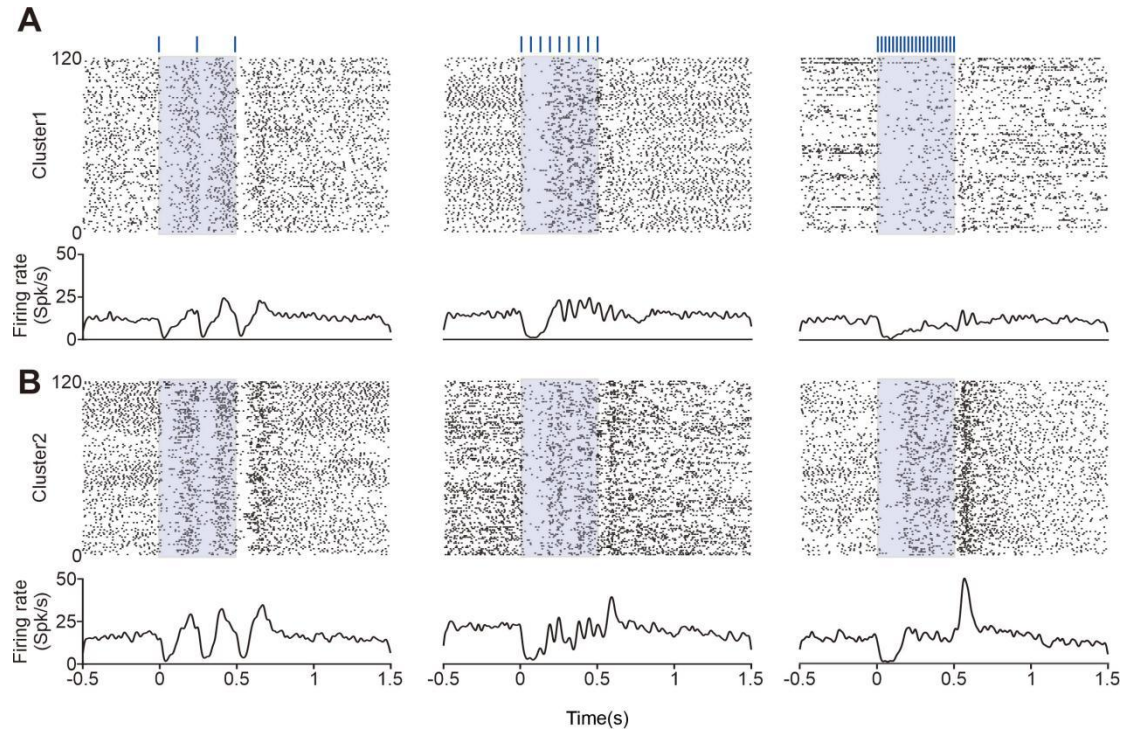
Supplementary Figure 1.



Supplementary Figure 1 | Principal Component Analysis (PCA) scatter plot of MD neuron auditory responses.

Based on evoked responses under 16 Hz auditory stimulation (1,188 neurons). Blue dots: Cluster 1; Red dots: Cluster 2. Asterisks: Corresponding coordinates of representative neurons shown in Figure 2.

Supplementary Figure 2.

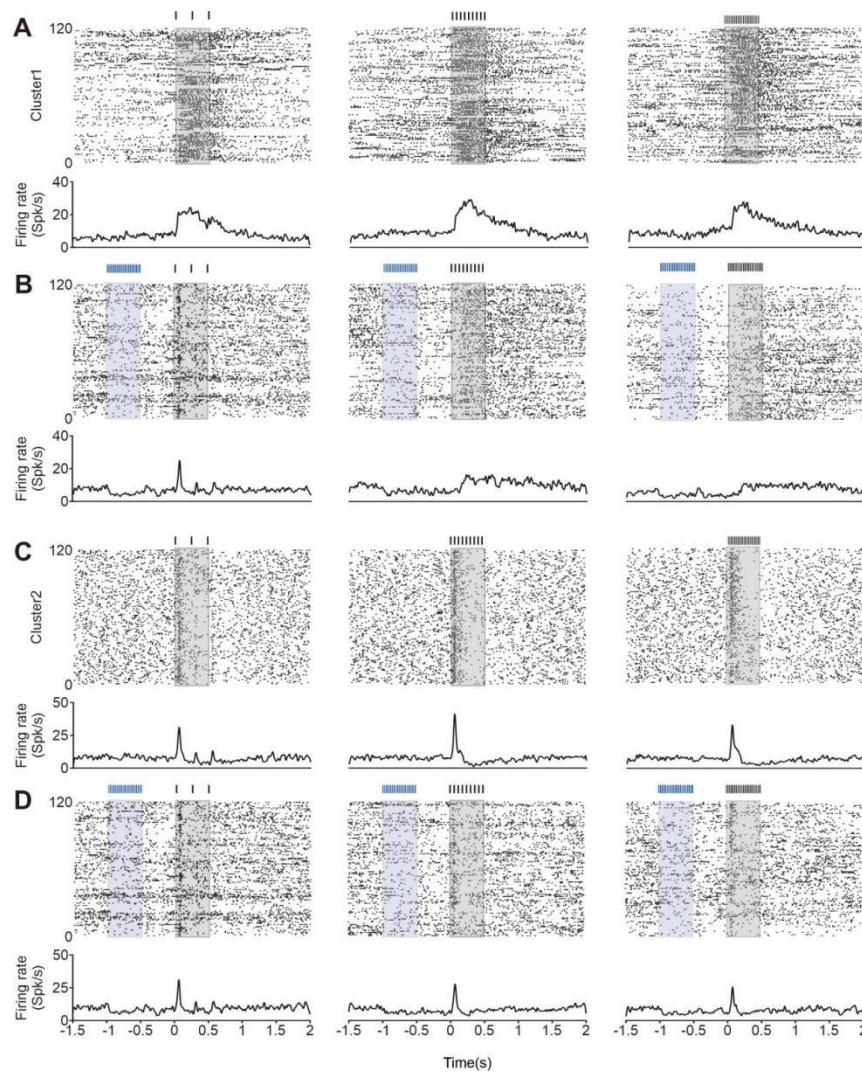


Supplementary Figure 2 | Response patterns of representative MD subpopulation neurons to PFC optogenetic inhibition.

(A) Raster plots (top) and PSTHs (bottom) of a representative Cluster 1 neuron in response to 4, 16, and 40 Hz optogenetic inhibition. Blue vertical lines: light pulse timing; Blue rectangle: 0.5 s optogenetic inhibition window.

(B) Optogenetic inhibition responses of a representative Cluster 2 neuron. Format identical to (A).

Supplementary Figure 3.

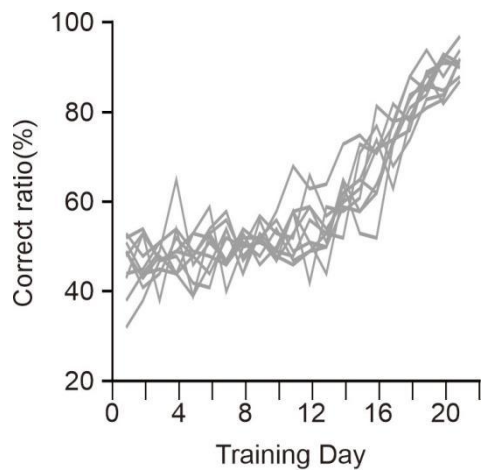


Supplementary Figure 3 | Auditory response patterns of representative MD subpopulation neurons under PFC optogenetic inhibition.

(A, B) Auditory responses of a representative Cluster 1 neuron. Raster plots (top) and PSTHs (bottom) under light-off (A) and 40 Hz optogenetic inhibition (B) conditions. Black/Blue vertical lines: sound/light pulse timing; Gray/Blue rectangles: 0.5 s sound stimulation / optogenetic inhibition windows.

(C, D) Auditory responses of a representative Cluster 2 neuron. Response performance under light-off (C) and optogenetic inhibition (D) conditions. Format identical to (A, B).

Supplementary Figure 4



Supplementary Figure 4 | Population learning curve of the control group ($n = 10$):
Dynamic changes in discrimination accuracy over 21 consecutive days of training.