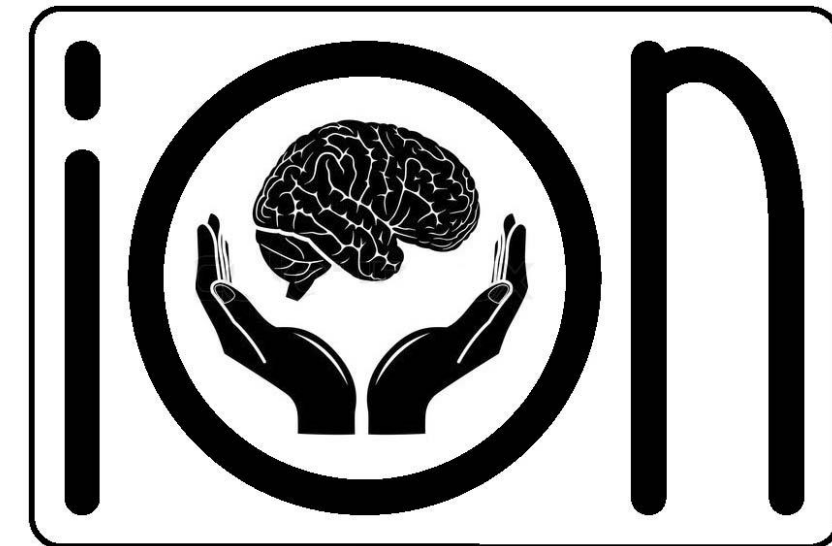




Active Olfactomotor Responses in Head-Fixed Mice

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BACKGROUND

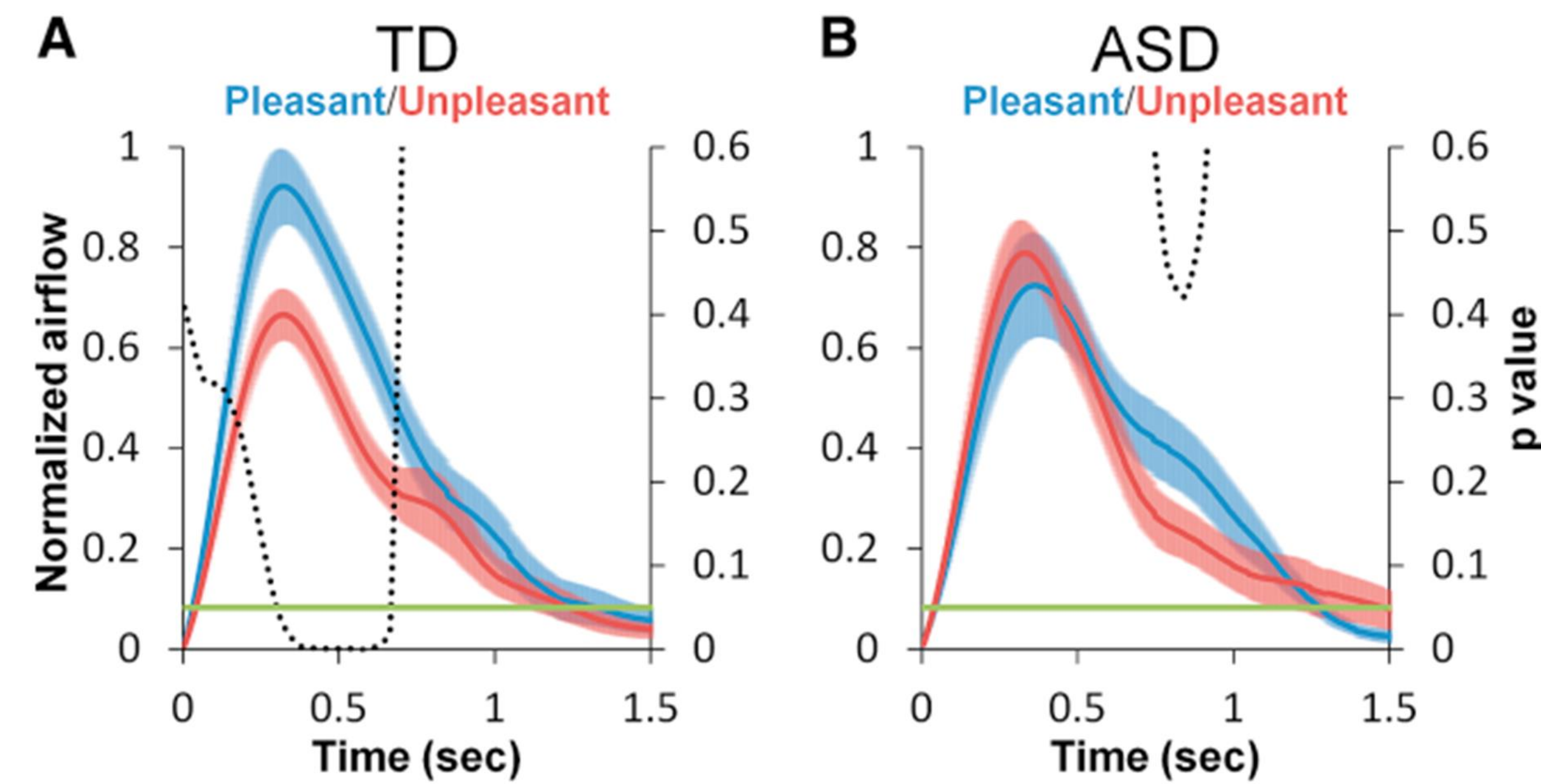


Figure 1 Image adapted from Rozenkrantz (2015). TD represents Typically Developing or Neurotypical children. ASD represents children with Autism.

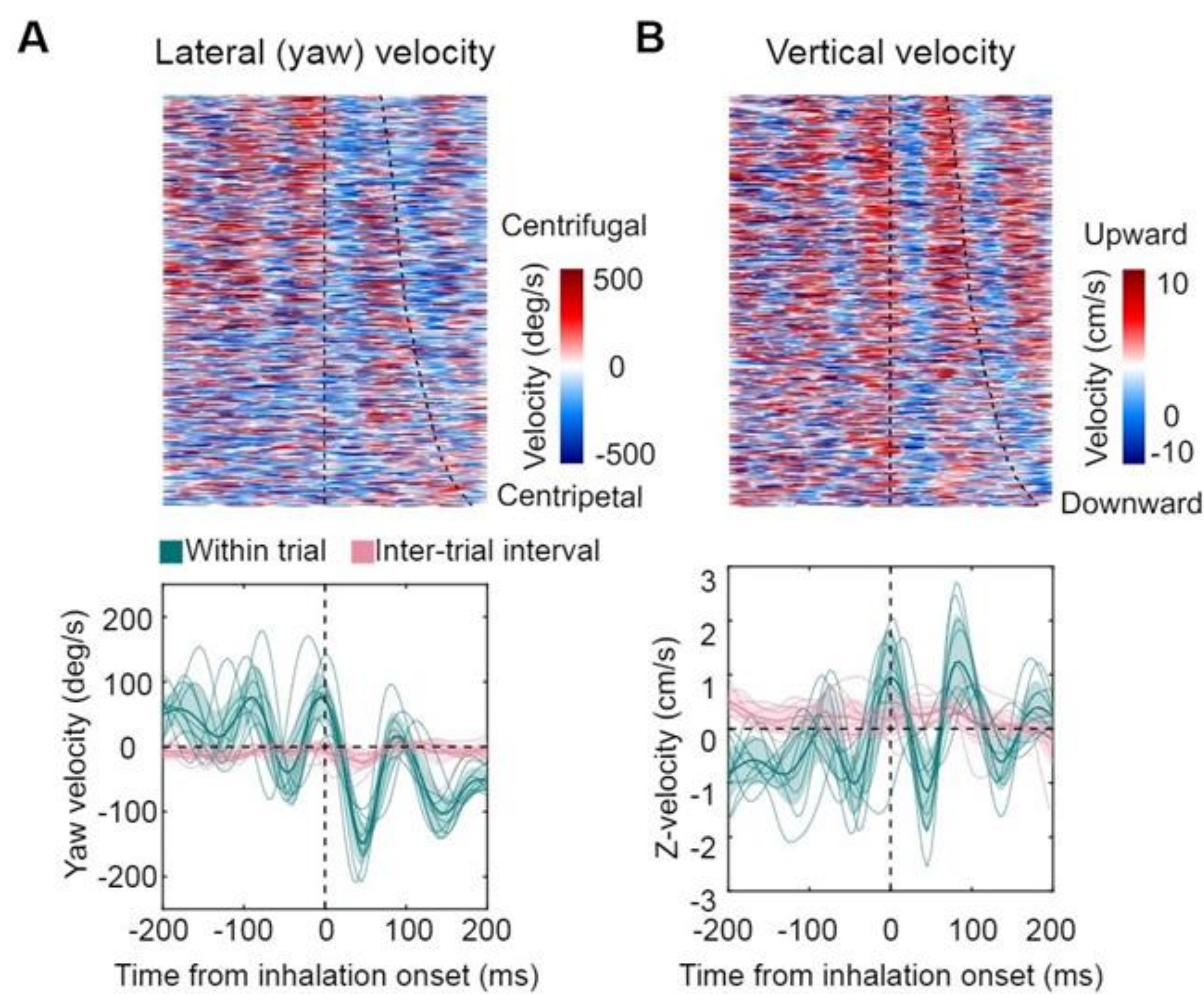


Figure 2 A) Top: Colored plot showing lateral velocity (moving nose side to side) aligned to inhalation onset for within-trial sniffs taken before crossing the decision line. Dotted line at time 0 denotes onset of inhalation and second line marks end of sniff cycle. Bottom: Sniff-averaged of lateral velocity of 11 mice for within-trial and inter-trial intervals. (Findley 2021)



Symptoms	CNTNAP2- Mouse	Wildtype Mouse
Normal Vocalizations	✗	✓
Normal Socialization	✗	✓
Repetitive Behaviors	✓	✗

Figure 3 Using genomic technology, scientists have developed mouse models of ASD such as contactin-associated protein-like 2 (CNTNAP2) mice. CNTNAP2- mice display many of mouse equivalent symptoms of ASD such as increased grooming (repetitive behaviours), less social interactions, and abnormal vocalizations

OBJECTIVE OF RESEARCH

Goal of our research is to investigate the neural mechanisms underlying altered sniff sampling observed in children with ASD

METHODS

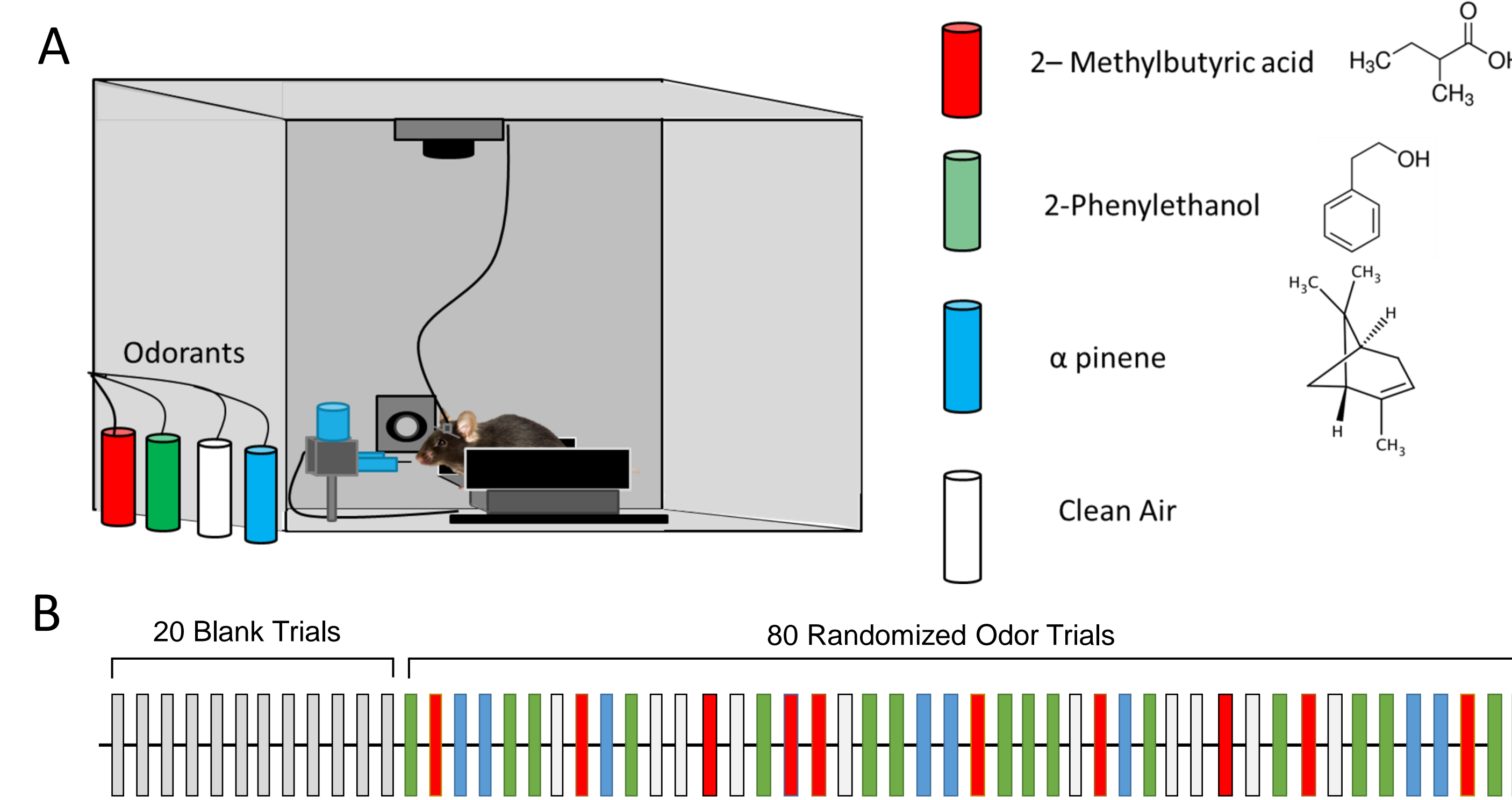


Figure 4 A) Depiction of the experimental set up. B) Example of a single session. Colors coordinate with the colored odorants in Figure 4A

RESULTS

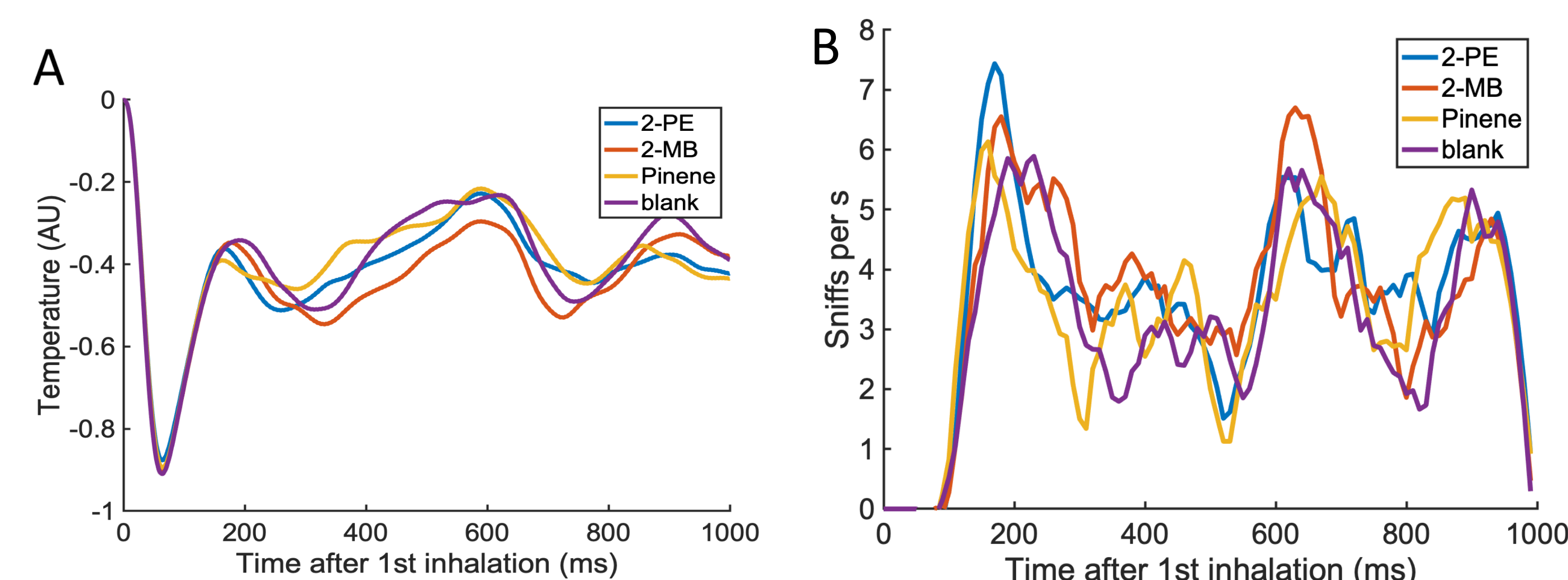


Figure 5 A) Peristimulus Time Histogram (PSTH) of volume of odorants inhaled over time. B) PSTH of sniffs per second (speed) of odorants inhaled after first inhalation

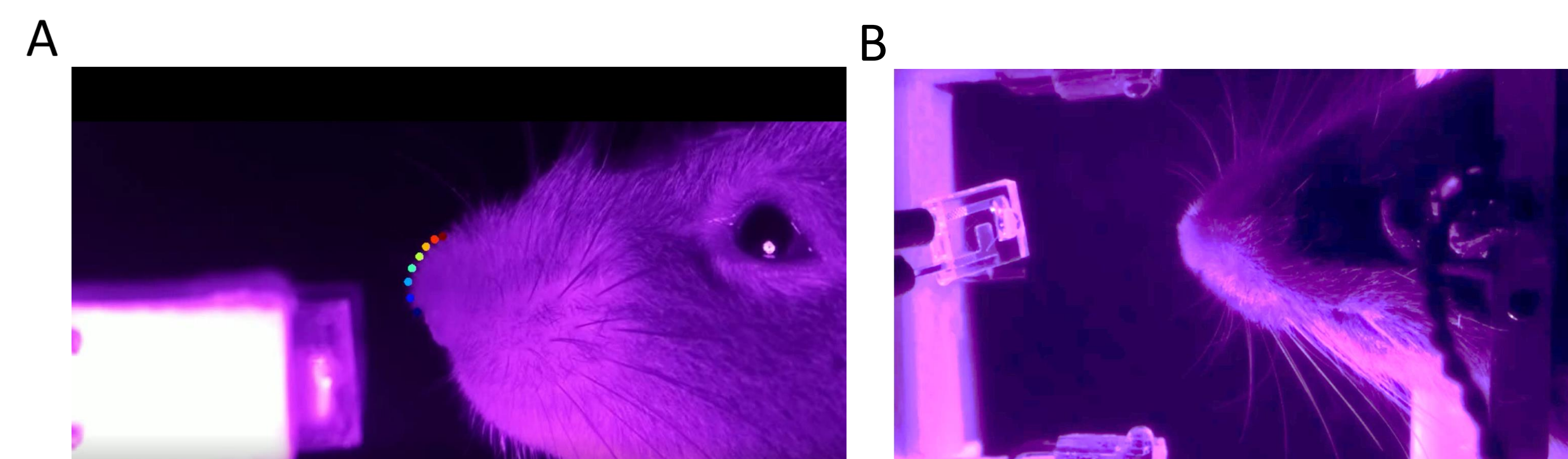


Figure 6 A) Side Profile of mouse during a trial. Image is colored by an infrared filter. Colored dots denote the outline of the nose for analysis using DeepLabCut B) Bottom profile of mouse during a trial.

FUTURE DIRECTIONS

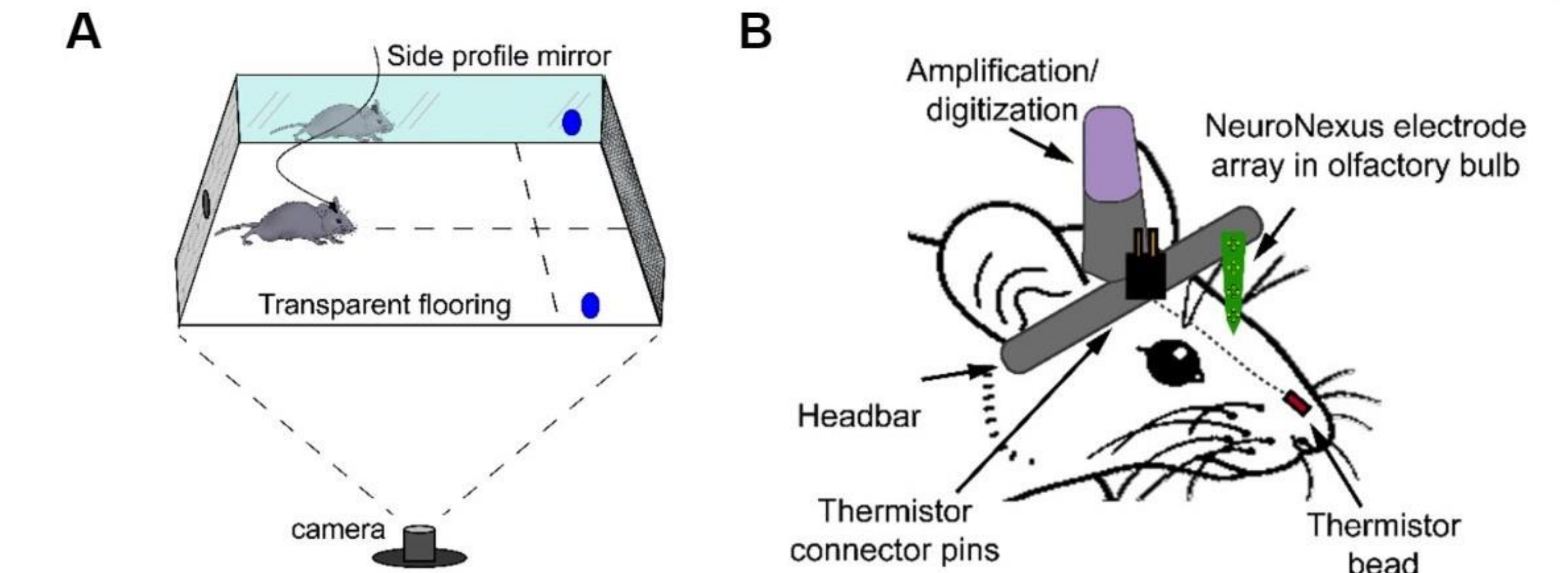


Figure 7 A) Image depicting the freely-moving behavioral arena while recording activity using an electrophysiology (E-Phys) system. B) Image demonstrating the surgical changes needed to record activity in freely moving mice using thermistors and E-Phys.

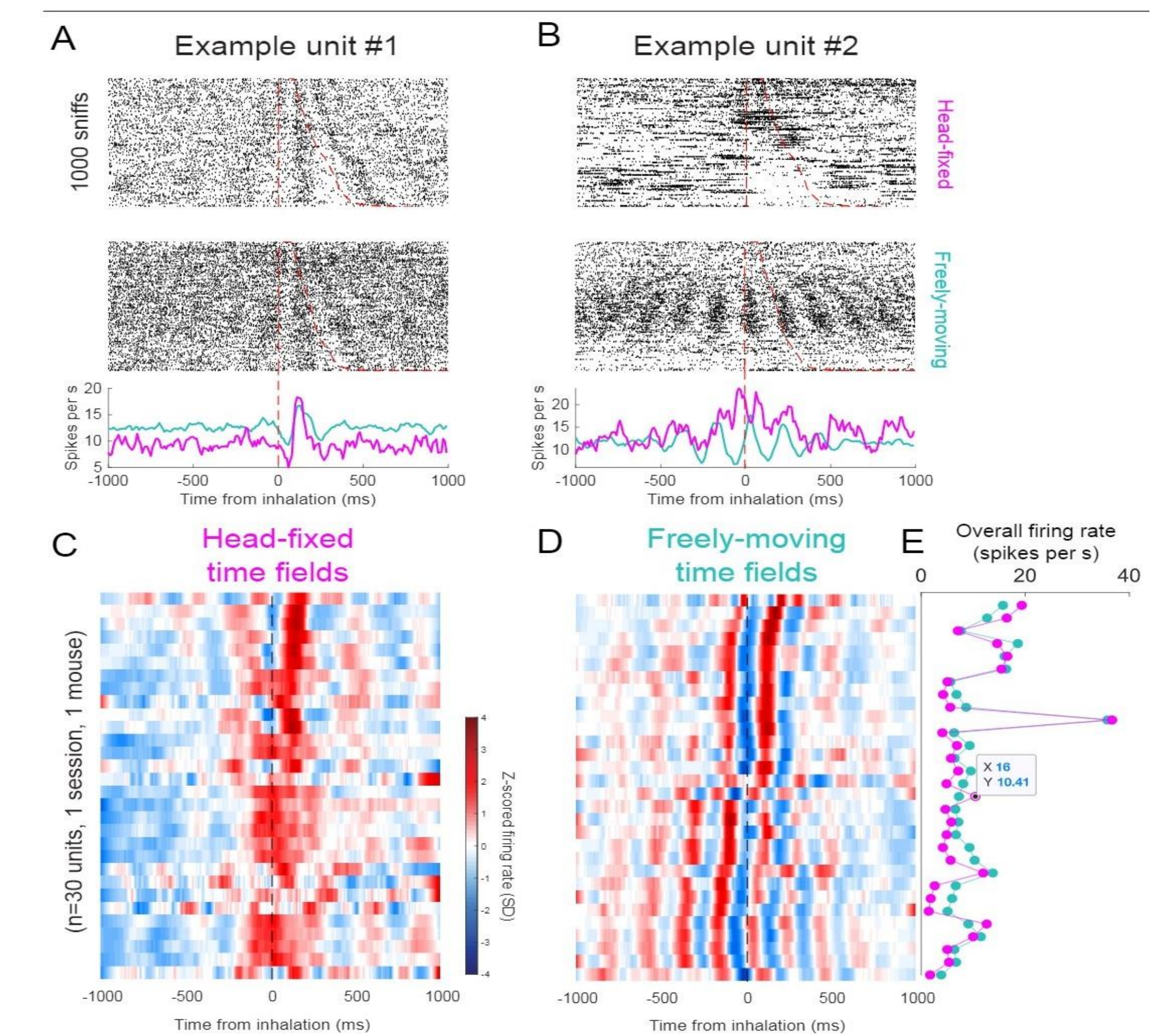


Figure 8 A) Top: Spontaneous activity from one cell in the olfactory bulb while the mouse is head-fixed. Middle: Spontaneous activity in the same cell when freely-moving. Bottom: PSTH of neuron's activity comparing freely moving and head-fixed. B) Same as A in another cell within the olfactory bulb. C) Sniff-Synchronized Time Fields (SSTF) for 30 units recorded simultaneously while head-fixed. D) SSTFs while freely moving. E) Overall firing rate does not differ between head-fixed and freely moving.

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