Multi-sensory integration during pheromone-plume tracking of male silkworm moth, *Bombyx mori*

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Multi-sensory integration is a prominent mechanism for insects to elicit specific behavioral repertoire, and is believed to be important for further understanding of complexity and adaptability in animal. Previous studies showed that during pheromone-plume tracking male silkworm moth, *Bombyx mori*, manipulates both visual and olfaction inputs in order to successfully localize to source under high uncertainty environment. However, the visual effect on the behavior has not yet been well identified.

In this behavioral study, we presented the insect with pheromone stimulation and moving grating pattern, then monitoring its locomotion pattern. The results show that silkworm moth's innate programmed behavior, which consists of surge, zigzag and loop, can be modulated by visual stimuli. During surge, visual input modulates programmed behavioral pattern by increase of angular velocity toward the direction of moving pattern, while during zigzag duration of each turn is modulated by increase of turn duration when insect turns to the opposite direction to that of the moving pattern and decrease of turn duration when it turns to the same direction. These findings demonstrate that multi-sensory integration in silkworm moth is an internal state-dependent mechanism, as behavior during each behavior state is modulated differently by optic-flow information.