BraintankAI

DISPATCH · INSECT NAVIGATION MEMORY · 2 MIN

Lifting inhibition may let flies write a heading into a memory circuit

Imaging, recordings and modelling of a ring-shaped circuit in the fly brain suggest that lifting inhibition lets the circuit rapidly write a heading into memory.

10 November 2026 · based on a paper in Nature



Photo: Malcolm Choong

Holding something in mind for a few seconds, such as a phone number or a direction to walk in, is widely thought to rely on recurrent attractor networks. These are circuits of neurons that excite one another so that a pattern of activity, once started, keeps itself going. That stability raises a puzzle. Working memory has to be written and erased on demand, yet it is unclear how such stable activity can be switched on and off rapidly. A study published in Nature in 2026, by Aaron Lanz, Katherine Nagel and colleagues at New York University, NYU Langone Health, the University of Pittsburgh and Marshall University, examines how one small circuit manages both.

The circuit sits in the fly's navigation centre, where two types of neuron, hΔK and PFG, are wired to each other in a ring. The authors imaged these neurons in living flies. They report that both populations share a bump of activity, a localised patch whose position around the ring stands for a direction. The bump appears when the fly smells an odour and lasts until the end of a goal-directed run upwind.

The team also made whole-cell recordings, which measure electrical signals inside single neurons. These showed that persistence in hΔK depends on recurrent signalling. They also showed that hΔK receives slow recurrent excitation and fast inhibition from its synaptic partners. In a computational model, that combination produced persistent attractor dynamics over a range of excitation and inhibition strengths. The authors present this pairing as one source of the circuit's stability.

The switching mechanism emerged from a difference between the two populations. During goal-directed runs, both bumps hold a steady position. During turns and rest, the PFG bump follows the fly's heading while hΔK is suppressed. The authors reproduce this in their model by using inhibition to uncouple hΔK from PFG. In the model, while hΔK is inhibited, PFG simply follows its inputs from the brain's compass system. When the inhibition on hΔK is removed, a process called disinhibition, the recurrent loop locks the current heading in place as a memory. The data fit this picture. According to the study, inhibitory input onto hΔK rises during turns and is suppressed during odour input and goal-directed upwind runs.

The authors conclude that disinhibition can act as a gate. It rapidly writes an ongoing measurement, here the fly's heading, into a recurrent memory circuit. The evidence comes from a single, discrete insect circuit. The gating account also rests on a model, and the findings on inhibitory input are described as consistent with that model. The abstract does not address whether the same split design operates in other memory circuits or in other animals.

PAPER	*A split attractor design for rapidly writing a navigational goal*
AUTHORS	Aaron J. Lanz, Nicholas D. Kathman, Emily Hao, Bard Ermentrout, Katherine I. Nagel
VENUE	Nature · 7 October 2026
LINK	doi:10.1038/s41586-026-11144-9
INDEX	stacks.braintank.ai