Revealing how flies make decisions on the fly to survive

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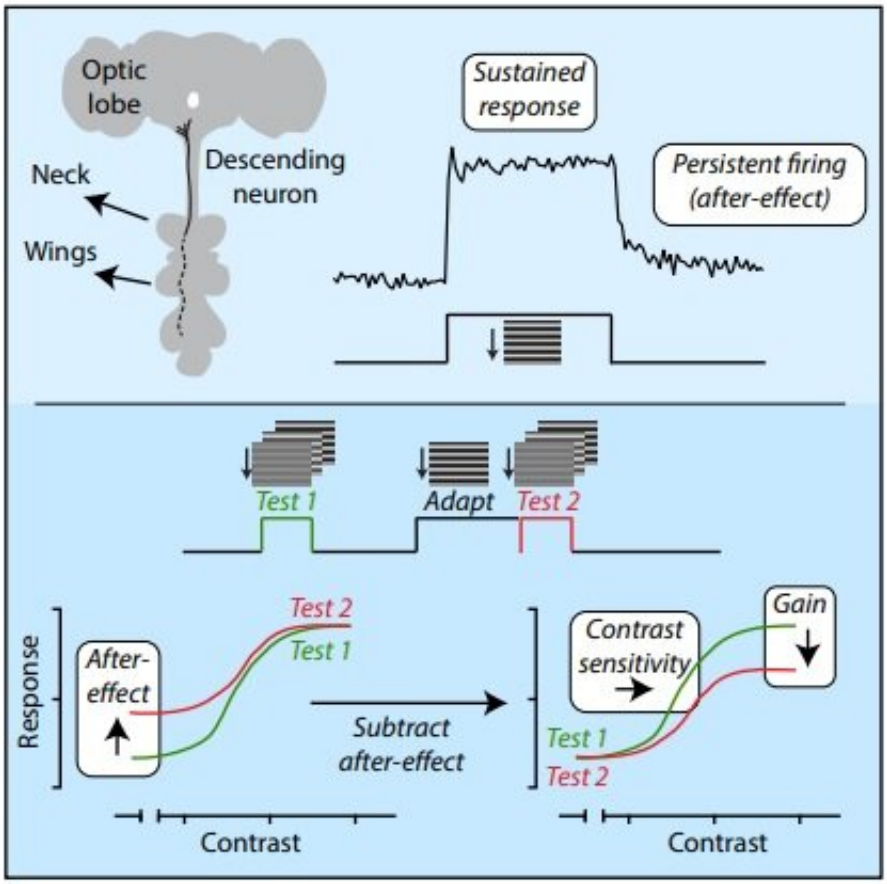


Abstract explaining sustained firing in optic flow sensitive descending neurons in flies. Credit: Professor Karin Nordstrom, Flinders University

Many insects process visual information to make decisions about controlling their flying skills and movements- flies must decide whether

to pursue prey, avoid a predator, maintain their flight trajectory or land based on their perceptions.

Why is understanding this process important? We move every day and perceive the world differently as a result.

For example, if you're driving on the freeway your visual system adapts to high speed, and after a while 50km/h feels very slow. In contrast, when running or walking you are able to maintain a more steady velocity.

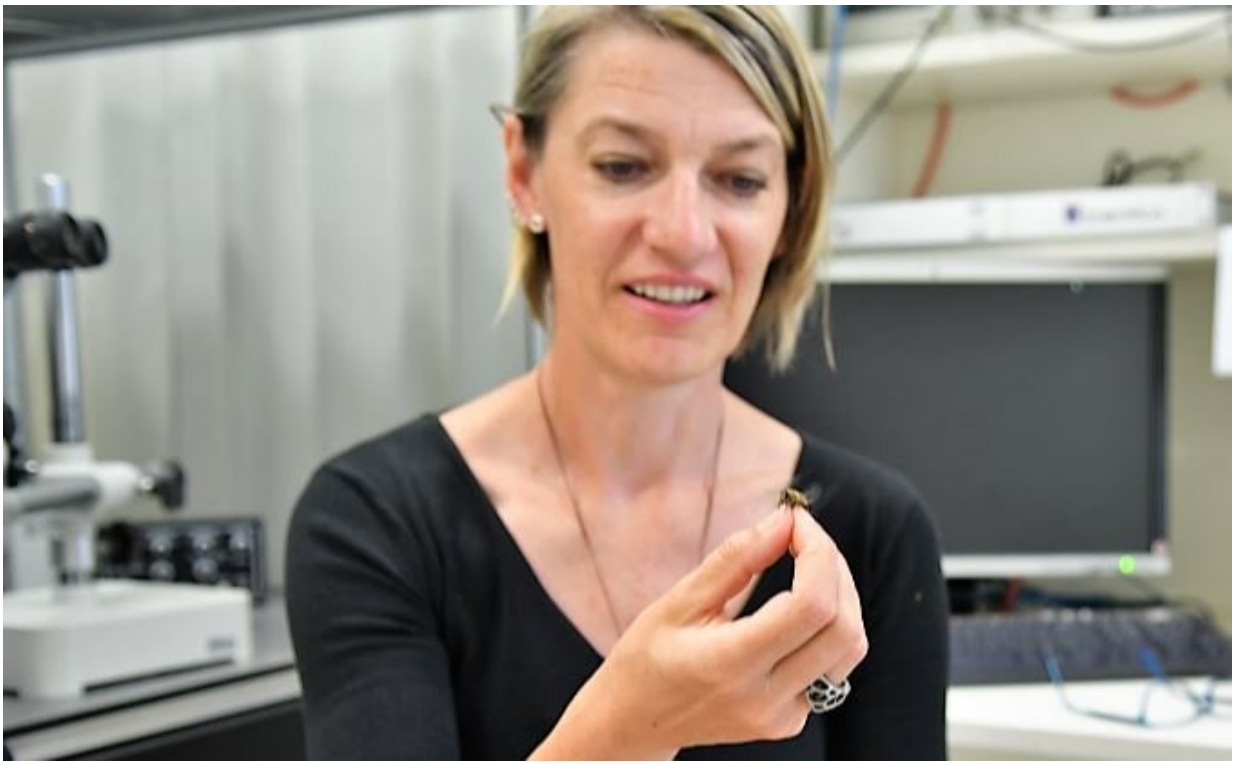
New research published in journal *Current Biology* describes the firing of descending neurons in hoverflies to examine the important link between neural processing in the central brain and their normal behaviour in flight.

These neurons correspond to descending neurons in our human spinal cord.

"As the spinal cord is very inaccessible in humans, flies become an excellent comparison model," says Professor Karin Nordström, a neuroscientist at Flinders University who studies how insects perceive the world while moving.

"The responses of these descending neurons help explain how and where this discrepancy between adaptation to motion and the ability to maintain more constant movement takes place."

"We found that these descending neurons continue to respond to visual motion, which is fascinating, as sensory neurons typically adapt." says Professor Nordström.



Professor Karin Nordstrom, College of Medicine & Public Health at Flinders University. Credit: Flinders University

The researchers investigated these significant observations in hoverflies by using test-adapt-test protocols, which are commonly used in visual science to quantify the effect adaptation has on responses to subsequent stimuli.

Flinders University Research Officer Sarah Nicholas says descending neurons haven't been studied enough and provide an important insight into the link between the brain and the resulting behaviour of hoverflies, and ultimately all vertebrates, including humans.

"These descending neurons show sensory properties (by adapting) as well as pre-motor properties (persistent firing), which is quite a unique

integration of neuronal responses."

"As motion vision, and adaptation, in flies show many similarities to those described in vertebrate cortical areas, and as persistent firing has been shown in both invertebrate and vertebrate central pattern generators, our findings are broadly appealing."

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