

# Researchers find high-resolution retina cells in mice only activate when birds fly over

August 14 2012, by Bob Yirka

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(Phys.org) -- In the eye, the retina is the light sensitive tissue that lines its inner surface; packed with ganglion neurons, its job is to convert incoming information to something that the brain can understand. In some animals, such as people, cats and the macaque, the density of neurons in certain areas of the retina accounts for the highest resolution images sent to the brain. But some animals apparently reserve such areas for other jobs. Mice for example, according to new research by a team from Harvard, only use their high resolution areas when under threat from above. As they describe in their paper published in the *Proceedings of the National Academy of Sciences*, the team notes that high density neural areas in the retinas of mice are only activated when shadows from birds flying overhead are detected.

In people, the highly dense parts of the retina are used virtually every

waking moment. When focusing on something, the [neural network](#) of [ganglion cells](#) is busy converting light to images that are sent to the brain via the [optic nerve](#). The only time this process quiets is when people are either lost in thought, or asleep. With mice, according to this new research, things are very different.

To find out how mice use their high-resolution ganglion, the team attached a [tiny camera](#) to a rat volunteer and then watched to see what sorts of things it focused on. Next, they played the video back directly onto the retinas of several test mice while simultaneously monitoring neural cell activity. In so doing, they found that the high-resolution cells sat mostly quiet, doing nothing.

As it turned out, the cells weren't actually doing nothing, they were waiting.

When silhouettes of birds were projected overhead, the waiting ended as the ganglia sprang into action, interpreting every movement. This shows, the researchers say, that the high-resolution neuron groups in mice retinas serve not as interpreters of everyday life, but as highly specific predator detectors. More specifically they found the nerves reacted when the birds were in their center of view, meaning close and ready to snatch them up. Sadly, they also found that the nerves quit firing once the birds came close enough, indicating the mice were doomed.

After testing several scenarios, the team found that the retina cells in the mice tended to fire when detecting virtually any object that appeared against a blank backdrop, which was also moving, such as is the case of a bird flying in the sky. Thus it appears, for mice, it's better to focus sharply only when predators from the sky are near, so as to best prepare for a quick emergency plan.

**More information:** *PNAS* August 13, 2012 [doi:](#)

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