

News
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Owl Hearing Relies on Advanced Math

By Kate Wong

Even under the cloak of darkness, a mouse that has attracted an owl's attention doesn't stand a chance. Within minutes, the bird swoops down silently and snatches the unsuspecting creature—an attack made possible by the owl's extraordinarily keen sense of hearing. Researchers knew that the owl's aural sensitivity allowed it to create a two-dimensional map of auditory space. But they may have underestimated the computing capabilities of the neurons that generate this map, according to findings reported today in the journal *Science*. Whereas most neurons are thought to add incoming signals together to come up with the appropriate neural response, the owl's auditory map neurons appear to multiply.



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Previous research had shown that one set of neurons in the owl's auditory system registers the sound level and sound timing differences between the ears, and then sends this information to the auditory map neurons, which lie in a region of the brain stem called the inferior colliculus. But exactly how the map neurons processed the incoming data was unknown. To address this, José Luis Peña and Masakazu Konishi of the California Institute of Technology studied the responses of owls exposed to pairs of sounds through headphones. The multiplication model, it turns out, predicted how the neurons respond to various stimuli with about 98 percent accuracy.

Though the researchers may have succeeded in describing the behavior of these neurons mathematically, the neurophysiological underpinnings of such multiplication remain a mystery—one they hope to unravel in the future.