Hear that? Visual signals update the barn owl's auditory map.

head size as the animal grows or hearing loss as it ages—will alter the information the brain receives. Without adjustment, the map would become misaligned, and the owl would miss its prey.

In January Knudsen's team identified a brain area called the optic tectum (OT) as the source of the visual signals that tweak the map: When the team members destroyed the connections between the OT and ICX, the map ceased adjusting. But despite the overwhelming evidence that visual signals help maintain the map, they still could not register a response in ICX neurons to visual stimuli.

Gutfreund wondered if the flow of information was somehow blocked in the anesthetized owls on which the experiments were done. He tried treating the OT with a chemical that can open up neural pathways that have been blocked by the inhibitory neurotransmitter GABA. After treatment, electrodes in the ICX began to pick up neural responses to flashes of light. The responses were specific: Just as each ICX neuron registers sounds from a particular location, each also selectively responded to visual cues from the same location. In mapping terms, that meant that the visual and auditory maps in the ICX are aligned.

Gutfreund next tricked the owls' brains to make the maps seem misaligned. Through headphones, he delivered sounds to the owls' ears that sounded as though they came from a place that was slightly offset from the location of the light. The ICX neurons responded much more strongly to the light than they had when the maps were aligned. That, says Gutfreund, is what one would expect for an instructive signal: It points out an error to be corrected.

"There are two different findings here," says Gutfreund. "The first is that visual responses can appear in the ICX, an auditory structure, but they are normally inhibited. The second is that the signals [have the right characteristics] to be the instructive signal."

With those findings, a "circle is closed," says neuroscientist Masakazu (Mark) Konishi of the California Institute of Technology in Pasadena: The researchers know where the visual information comes from and how it alters the map.

Now they are poised to answer the next round of questions. They will need to experiment on alert owls, says Catherine Carr, a neuroscientist at the University of Maryland, College Park, to learn what conditions normally open the gate for the visual signal. Grunewald offers a hint of what those conditions might be: He found in monkeys that the gating of sensory information seems to be governed by "the significance that the stimulus has in the context of the specific task," and he suspects that something similar occurs in the owl's brain.

Researchers can now also address in detail how the visual signal alters auditory neurons to bring about changes in the map. "It is becoming extremely clear that instructive error signals are going to be a major way you learn," Carr says, adding that the barn-owl example is one of the best characterized ones to date. And so the next round of experiments on the owl's auditory map is likely to have a wide audience.

–MARCIA BARINAGA

CREDITS: (TOP TO BOTTOM) Y. GUTFREUND *ET AL.*; RICH PEDRONCELLI/AP

ECONOMIC ESPIONAGE

Researcher Acquitted Of Lab Theft Charge

A jury last week found a scientist at the University of California (UC), Davis, not guilty of stealing vials of a protein gel used in ophthalmological research. More serious allegations of economic espionage had already been dropped by prosecutors, who originally had accused Bin Han, a Chinese-born researcher, of planning to take the materials to China to profit from them. The case has generated widespread attention and outrage among some Asian Americans, who maintain that they are being unfairly targeted at U.S. laboratories.

Han, 40, holds a graduate degree in veterinary studies from Xian University in central China and is a U.S. citizen. He had worked in the university's ophthalmology department for 13 years until he was fired on 13 May. A week later he was arrested, jailed, and charged with theft of trade secrets, possession of stolen property, and embezzlement. Yolo County prosecutors accused him of secreting in his home freezer half of a batch of 40 vials of protein gels used in cornea-transplant research that were owned by the university, with the intent of taking them to China for profit. Investigators also found a one-way plane ticket to China.

Legal victory. Bin Han with court documents asserting his innocence.

Han maintained that he had picked up the gels from a nearby company and had simply not delivered all of them to his lab when they were discovered in his home, where he lives with his wife and two children. He also said that he was planning to visit his ailing mother in China and that the ticket was open-ended, not one way. The charges eventually were reduced to a single misdemeanor charge of petty theft and embezzlement after his attorneys showed that the gels were readily available in China and that they had been provided without charge to the university, making them worth less than the $400 minimum for a felony charge.

The case has drawn the ire of many Asian Americans, including California state legislator Judy Chu. "I am distressed by the similarities between Dr. Han's case and that of Dr. Wen Ho Lee," the Los Alamos National Laboratory physicist who was charged with stealing classified material, Chu wrote in an 18 July letter to UC Davis Chancellor Larry Vanderhoef. "Cases such as those of Dr. Lee and Dr. Han further perpetuate the misconception that Asian Americans cannot be trusted, are not loyal to the United States, and pose flight risks, simply for being of Asian heritage."

Han says that he may fight to get his job back. The university told him it was terminating his contract because he did not provide the necessary supervision to a graduate student, Han says, but he claims that the real reason was his refusal to allow a senior researcher to claim credit for work done solely by Han. "I argued with him, and he got very mad," Han said.

University officials declined to discuss the reasons for Han's firing, but they said the university is looking into the grievance he has filed. "The university is committed to conducting a thorough review of this grievance and reaching a fair and equitable resolution," says campus counsel Steven Drown. Drown says that the university might also conduct an in-house "administrative review" of the issues raised in the criminal trial.

–ANDREW LAWLER