Brain Recordings Take Flight

By Kelli Whitlock Burton
*Science*NOW Daily News
26 June 2009

Homing pigeons use landmarks to guide them safely home. But how do the birds track these familiar sites hundreds of meters below as they zip by at 65 kilometers per hour? Scientists are trying to answer that question with a new device that lets them record brain activity as pigeons fly.

Enlarge Image

The Neurologger2 weighs just 2 grams but can record for days.

CREDIT: ALEXEI VYSSOTSKI

Exactly how pigeons find their way home is a mystery. While some studies suggest the birds rely on smells, the position of the sun, or Earth's magnetic field to navigate, scientists also know that pigeons use visual landmarks. To see how the pigeons' brains processed these sights, Alexei Vyssotski and colleagues at the University of Zurich in Switzerland developed the Neurologger2, a device that simultaneously tracks the birds' route while also recording brain activity as they fly over familiar sites.

Neurologger2 weighs just 2 grams and uses an electroencephalogram to record brain activity. In a study published online this week in *Current Biology*, the scientists trained 26 pigeons to recognize a loft as their home base. Then, they implanted tiny electrodes on the birds' brains and connected them with Neurologger2. They outfitted the birds with global positioning system monitors and then released them from different points 10 to 30 kilometers away from the loft.

Once the birds returned, the researchers removed the devices and compared the record of the birds' brain activity with their positions at the time. Vyssotski found that when the birds flew over landmarks, such as a familiar highway, high-frequency brain waves suddenly got more intense. They also noted more spikes in high-frequency brain waves when the birds passed by familiar terrain than when they flew over a featureless stretch of water. Vyssotski suspects that the high-frequency waves are tied to recognition of sites the birds knew.

The study offers an interesting look inside the birds' brains during flight, says Brett Gibson, who studies animal cognition at the University of New Hampshire in Durham. "Still, I'd want to know if this activity is just restricted to navigation or is it more broadly related to object recognition, and what's triggering that activity?" These are all questions Vyssotski's team plans to investigate.

Irene Pepperberg, a psychologist at Harvard University who works with parrots, is also enthusiastic about the new technology. "This is one of the first papers to show we can use a real-time system to analyze the neurobiology of the avian brain," she says. "This technology could really teach us so much about how birds' brains process many different types of sensory information."

And Neurologger2 isn't just for the birds. Vyssotski is collaborating with scientists around the world on studies of sloths, mice, and marine mammals such as dolphins and seals.

(skip to comments for this article)

Comments

Thanks for your feedback. Please keep it polite and to the point.

My buddys and I were just talking about this last night and one of them knows a — Whitedog