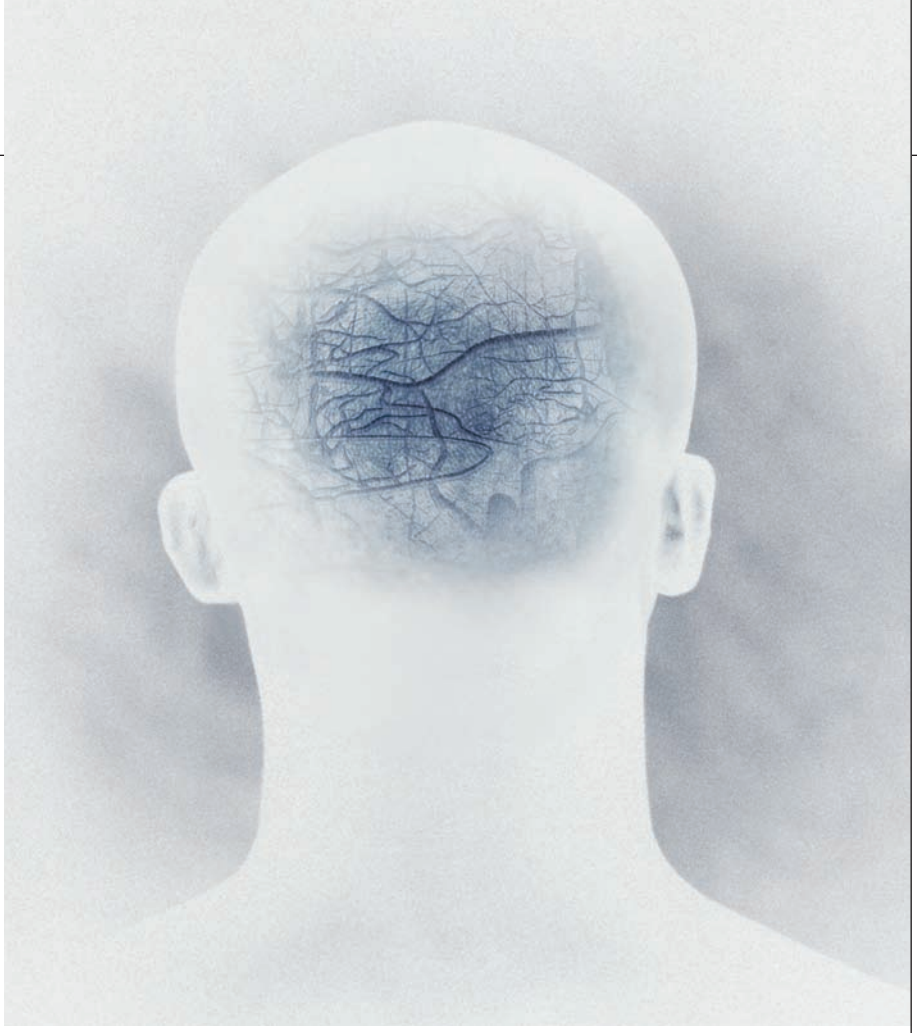

>> NEUROSCIENCE

Brain Freeze

Cooling down parts of bird brains reveals clues about motor behaviors

Some of us sing, and some of us just mouth the lyrics, but we all rely on our brain to coordinate even the simplest motor behaviors. Scientists interested in the brain activity behind motion often use birdsong as a model because certain songs are sung the same way every time, providing a naturally controlled setting for investigation. Now researchers have solved a long-standing mystery about the hierarchy of brain regions essential for birdsong using a chilly technique that could tease out the interconnected processes behind many complex actions.

Birdsong experts have debated whether the HVC (for "high vocal center") controls both the duration and onset, or timing, of a melody's notes—or whether duration or onset is controlled elsewhere, such as in the robust nucleus of the arcopellum (RA). But they were stymied because surgically removing either region prevented the birds from singing at all.

Because brain cell activity is known to slow at low temperatures, Michael Long and Michale Fee of the Massachusetts Institute of Technology inserted tiny wires that transmitted heat into and out of the HVC and RA in zebra finches. Cooling the HVC reduced the speed of the song by up to 40 percent. Cooling the RA had almost no effect, implying that the HVC plays a more central role in song generation, controlling both when notes begin and how long they last. The birds recover fully from this "localized cooling," making it a powerful tool to investigate the many complex behaviors that rely on a combination of brain regions.

Studies using localized cooling could "probably explain processes beyond a song-control system, even beyond a speech system," predicts Erich Jarvis of Duke University, who was not involved in the study. The neural networks that control the timing and sequence of motor behaviors are relatively poorly understood, Jarvis explains; cooling could illuminate how the brain orchestrates everything from wing flapping in birds to, perhaps, sign language and dancing in humans.

—Lucas Laursen

>> EMOTIONS

Put on a Happy Face

Forcing a smile for social reasons is hardwired in the brain

Are the facial expressions we use to signify social emotions learned by observing others, or are they hardwired genetically? The latter, according to a study in the *Journal of Personality and Social Psychology* that examined the reactions of athletes participating in judo competitions at the 2004 Olympic and Paralympic Games. The fighters, some of whom were blind and could not have picked up expressions through observation, all wore the same forced "social smile" when at the podium after having just lost a gold medal match.

—Nikhil Swaminathan

RALPH MERCER *Getty Images (brain-freeze illustration)*; ENS BUETTNER *epa/Corbis (Olympians)*