Why the Deaf Have Enhanced Vision

Deaf people with **enhanced vision** can thank otherwise idle **brain cells** for their heightened **sense**, a new study in cats suggests. That's because the brain recruits cells normally devoted to hearing to help them see better, the research **revealed**. "The brain is very **efficient** and it's not going to let this huge territory that is the auditory cortex and all the **processing** that it has go to **waste**," said study leader Stephen Lomber of Canada's University of Western Ontario. The auditory cortex is the part of the brain that **controls** hearing. "So it **makes sense** that other senses will come in and colonize."

Deaf-Cat Experiments Reveal Brain's Wiring

In behavioral tests, Lomber and his team **determined** that domestic cats born deaf have better peripheral vision and motion-detection abilities than cats born with normal hearing—a **finding** that parallels visual test results in deaf people. Next, the researchers used a **surgical method** called reversible deactivation to **temporarily** cool and render inoperative parts of the brain. This **enabled** the scientists to pinpoint which parts of the brain were **responsible for** the enhanced visual abilities. "Reversible deactivation is very powerful because you can test an animal before you deactivate an area of the brain, again while the area is deactivated, and a final time when the brain is rewarmed afterward," said study team member Alex Meredith, a neuroscientist at Virginia Commonwealth University. "It's like having a **stroke** without losing brain **tissue**." The scientists found that when they cooled the part of the deaf cats' auditory cortex **involved in** peripheral hearing, the animals lost their peripheral vision **advantage**. Likewise, when the scientists deactivated the part of the brain normally involved in **discerning** which direction a sound was coming from, the deaf animals fared no better than normal cats in visually detecting motion. "These visual functions [that are enhanced] don't just **randomly** redistribute" in the auditory cortex, Lomber said. "They actually seem to **take up** residence in an auditory area that would **perform** a similar function."

Improved Treatment for the Deaf?

More studies will reveal if the same is true in humans, the authors said. But the cat experiments do explain "why, in deaf humans, some visual **skills** get better and others do not change at all," said Daphne Bavelier, a neuroscientist at the University of Rochester in New York who was not involved in the study. The research, published October 11 in the journal Nature Neuroscience, also seems to explain why deaf individuals who **receive** a cochlear implant later in life don't regain as much of their hearing compared with people who receive the implants as young children. A cochlear implant is a small electronic device surgically **inserted** under the skin that can give a sense of sound to a deaf person. "If you **delay** the implantation, then the brain reorganization that **occurred** [in early life] is more or less locked in," study leader Lomber said. "The brain's lost the ability to reorganize a second time and push the visual functions out." But Lomber and colleagues say the research could lead to i**mproved** cochlear implants that **target** specific regions of the auditory cortex, such as the part involved in understanding speech, for example. "If you can understand the changes that the brain is going to **undergo** and the areas that you really want to target with your signals, then you can create a next-generation type of cochlear implant that better serves the needs of the brain," Lomber said. Bavelier, who wrote a commentary about the research in Nature Neuroscience, agreed. Understanding how the auditory cortex functions in young deaf people is "**critical to** our understanding of how to **maximize** the chances of successful implant," she said.

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