Why blind brains never stop seeing

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EVEN decades after someone loses their sight, the brain preserves at least some of its original ability to process visual information. The discovery raises the hope that one day some blind people may regain normal sight.

So far a tiny number of blind people have been lucky enough to get back some of their vision via surgery, but these operations are very rare. Researchers are working on retinal implants and gene therapies that might restore much more sight to many more people, but whether this will be possible depends not just on our ability to repair the eye, but also on whether the brain can still interpret visual signals from the eye after years of blindness.

When people go blind early in life the region of the brain that specialises in vision gets reassigned other functions, such as processing sensations of touch, sound and speech. "It's a large part of the brain, and it's valuable real estate," says Melissa Saenz, a neuroscientist at the California Institute of Technology in Pasadena. What was unclear was whether key parts of the original brain wiring are preserved during reassignment – and thus, whether normal sight is even possible if the eye is repaired.

The question might have stayed unanswered if Saenz hadn't been given the rare opportunity to image the brains of two people whose sight was surgically restored in middle age after they'd been blind since early childhood.

Her team focused on a portion of the brain's visual cortex called the MT+, which responds specifically to visual motion in the brains of sighted people. The formerly blind people lay inside an MRI scanner while watching images of moving dots, and then listening to a variety of sounds. As expected, the researchers found that the volunteers used their MT+ to process both sound and vision, unlike normally sighted volunteers, who only used the region for vision.

The surprise find was that the MT+ of the newly sighted volunteers only lit up for motion-related sounds – those that swept from one ear to the other. Changes in volume or pitch had no effect (*Journal of Neuroscience*, vol 28, p 5141). In other words, even while someone is blind, the visual part of the brain retains its original ability to detect motion, and merely switches senses during reassignment. This suggests that the brain is very conservative during reassignment and raises hopes that full vision can be restored. "This area has a capacity to maintain its specialisation even without the usual inputs," says Saenz.

Geoffrey Aguirre, a neurologist at the University of Pennsylvania in Philadelphia, who is testing a gene therapy to restore a missing enzyme that causes one form of congenital blindness, is now more optimistic that people will be able to tap into their brain's full visual-processing machinery when their eyesight is restored. "They'll not just have working eyes, but working vision – working eyes hooked up to a working brain," he says. Such therapies have the potential to help people who have some ability to sense light and dark, which includes some who are born blind.

Made for sight, tuned into sound