

# For hearing parts of brain, deafness reorganizes sensory inputs, not behavioral function

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– The part of the brain that uses hearing to determine sound location is reorganized in deaf animals to locate visual targets, according to a new study by a team of researchers from Virginia Commonwealth University and the University of Western Ontario in Canada.

These findings propose a new theory for cross-modal plasticity: loss of one sensory modality is substituted by another while maintaining the original function of the brain region.

It is known that persons who have suffered major sensory loss, such as deafness, show compensatory, or even superior performance in the remaining senses. This occurs through a process of cross-modal plasticity, where loss of one sensory modality is replaced by the remaining senses. But researchers have not known how the brain region vacated by one sensory modality selects its sensory replacement – until now.

In a study, published online the week of May 9 in the Early Edition of the [Proceedings of the National Academy of Sciences](#), the team first examined the region of auditory cortex in hearing adult animals that responded to auditory stimuli and controlled orienting and localization behaviors in response to sounds.

"However, in deaf animals, that same cortical region responded to visual

stimuli yet still controlled orienting and localization behaviors, thus preserving the functional role of the region despite the loss of its original sensory inputs," said principal investigator Alex Meredith, Ph.D., professor in the VCU Department of Anatomy and Neurobiology in the VCU School of Medicine.

According to Meredith, this research provides insight into brain reorganization following sensory loss, which may help researchers better understand how rehabilitative medicine, such as cochlear implants, may function more effectively in deaf patients.

These findings build on research published last year in the journal *Nature Neuroscience* by Meredith and colleagues from the University of Western Ontario. That research examined the brain regions in congenitally deaf adult animals responsible for cross-modal plasticity. Those results showed that cross-modal plasticity does not randomly distribute across the areas of the brain vacated by the lost sensory modality, but demonstrated that cross-modal plasticity takes up residence in selected areas. The present study indicates that [brain](#) areas exhibiting cross-modal plasticity retain their original behavioral function.

Provided by Virginia Commonwealth University

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