

## Blind brain receives 'visual' cues to identify shape

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A significant number of blind humans, not unlike bats and dolphins, can localize silent objects in their environment simply by making clicking sounds with their mouth and listening to the returning echoes. Some of these individuals have honed this skill to such a degree they are not only able to localize an object, they are able to recognize the object's size and shape – and even identify the material it is made from.

Researchers at Western's Brain and Mind Institute (BMI) used functional <u>magnetic resonance imaging</u> (fMRI) to study the brain of renowned blind echolocator Daniel Kish as he listened to recordings of his own mouth clicks and the echoes reflected back from different objects.

The results of this study, which was carried out in collaboration with colleagues based in Durham University in the U.K., the Rotman Research Institute at the Baycrest Hospital in Toronto, and World Access for the Blind, a not-for-profit organization based in California, appeared this week in the journal <u>Neuropsychologia</u>.

In keeping with the previous research from this group, the researchers found that areas in Kish's brain activated by the echoes corresponded to <u>visual areas</u> in the sighted brain.

But what has Mel Goodale, senior author and BMI director, most excited about the new findings is that the particular areas in Kish's brain that extract echo-based information about object shape are located in exactly the same brain regions that are activated by visual shape cues in the



sighted brain.

"This work is shedding new light on just how plastic the <u>human brain</u> really is," Goodale said.

Lead author Stephen Arnott of Baycrest's Rotman Research Institute explained, "This study implies that the processing of echoes for object shape in the blind brain can take advantage of the brain's predisposition to process particular object features, such as shape, in particular brain regions – even though the sensory system conveying that information is very different."

Kish lost both his eyes to cancer when he was only one-year old and taught himself to echolocate when he was a toddler. Interestingly, two other blind individuals who learned to echolocate much later in life do not show nearly the same level of <u>brain</u> activation in these 'visual' object areas as Kish.

Provided by University of Western Ontario

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