

# New study finds two ears attuned to high frequencies help us find objects using echoes

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The ability that some people have to use echoes to determine the position of an otherwise silent object, in a similar way to bats and

dolphins, requires good high-pitch hearing in both ears, according to new research from the University of Southampton.

The study, published in *Hearing Research*, found that locating an object by listening to echoes, without moving the head, requires good hearing at high frequencies and in both ears. This builds on research published in 2013 by the team at the University's Institute of Sound & Vibration Research (ISVR) that demonstrated conclusively that some sighted and blind people could use echoes in this way. What wasn't clear until now was how important high-frequency hearing in both ears is.

Dr Daniel Rowan, lead author of the study, says: "We know that hearing echoes is very important in daily life for some blind people. Hearing loss, such as associated with getting older, usually reduces hearing at [high frequencies](#) in both ears. Some people can develop deafness in one ear. We wanted to get some insight into how much those particular forms of [hearing loss](#) might affect users of echoes to locate objects: our results suggest they would struggle."

The researchers conducted a series of experiments with both sighted and blind people. In their most recent experiment, sighted people were asked if an object (in this case a flat MDF board) was to the left or right of them. The experiment used a 'virtual auditory space' technique originally created in ISVR's anechoic chamber, one of the quietest places on Earth, but reproduced for the participants over special earphones. This method allowed the researchers to remove audio and non-audio clues to the location of the object that are unrelated to echoes, such as the sounds and air movement associated with positioning the object.

Sounds were manipulated in various ways, simulating high-frequency hearing loss and single-sided deafness, as well as to check carefully that people were not finding cunning ways to use the echoes with one ear. People could locate the object accurately but only if they had good high-

frequency hearing and in both ears.

Dr Rowan adds: "Hearing aid services tend to focus on how well a person can hear speech. Our research indicates that those services also need to take into account whether someone needs to hear [echoes](#) in their daily life. For example, they might need [hearing](#) aids in both [ears](#), despite the emerging trend in some parts of the country to only fit one."

This work is currently being extended to detecting objects and using head movement to improve the localisation of objects. Initial results suggest a similar conclusion. A web-app will be launched later in the year for the public to try out the team's experiments themselves and see if they can 'make like a bat' too.

**More information:** "Use of binaural and monaural cues to identify the lateral position of a virtual object using echoes," *Open Access in Hearing Research*, doi: [dx.doi.org/10.1016/j.heares.2015.01.012](https://doi.org/10.1016/j.heares.2015.01.012)

Provided by University of Southampton

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