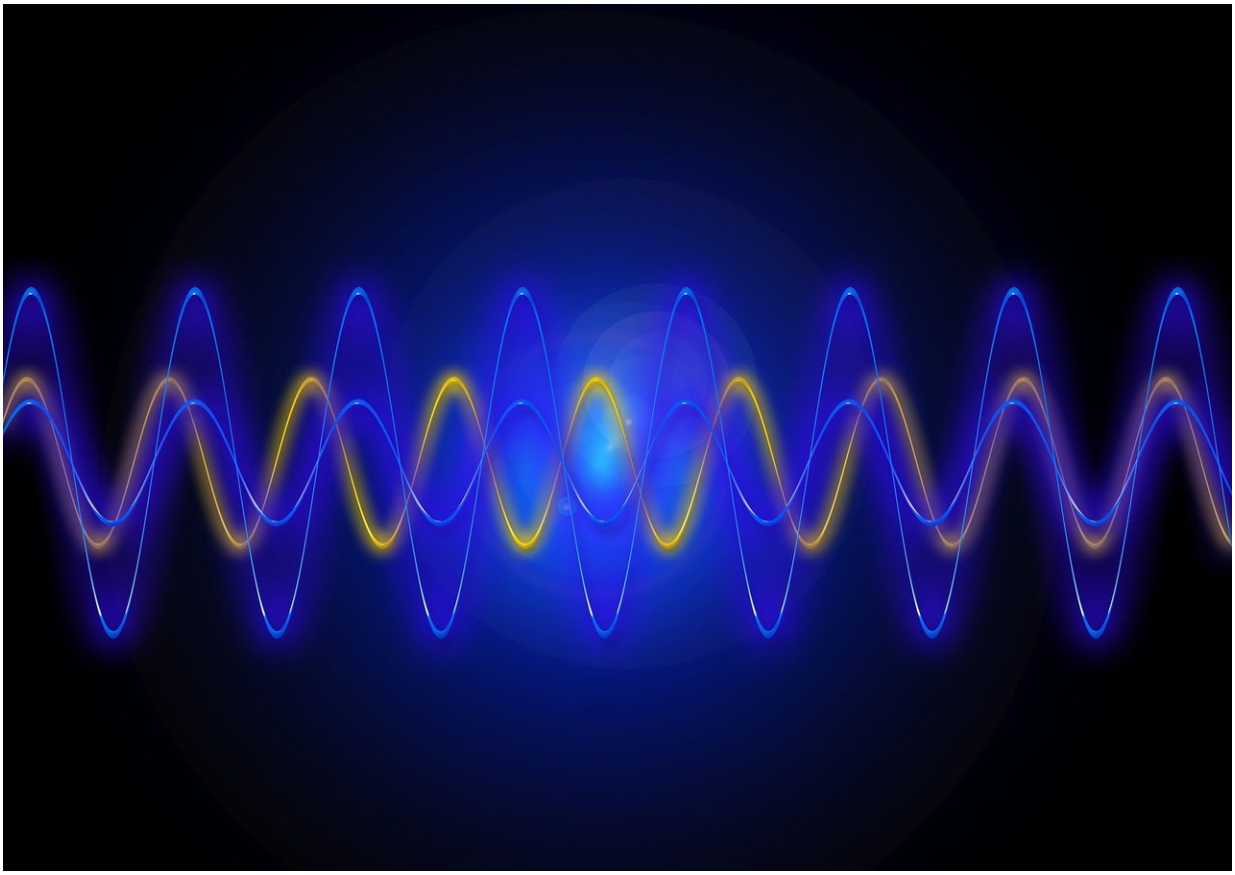
Echolocation in humans found to be more sensitive than thought

February 28 2018, by Bob Yirka



Credit: CC0 Public Domain

A team of researchers from the U.K., the Netherlands and the U.S. has found that echolocation in blind people is more sensitive than previously

thought. In their paper published in *Proceedings of the Royal Society B,* the group describes experiments they conducted with blind echolocation experts and what they learned from them.

Bats famously use echolocation to navigate and to capture prey—but echolocation in humans is not widely understood. Some blind people use it to identify nearby objects. They make sharp sounds with their mouths and listen for the echoes. This skill is useful for identifying where a chair in a room is, for example, or ducking to avoid bumping into a low door frame. But, as the researchers with this new effort note, very little is actually known about echolocation in humans. To learn more, the team enlisted the assistance of eight blind volunteers who had developed their echolocation skills to expert levels.

The experiments consisted of asking the volunteers to locate a plate affixed to a pole in an otherwise empty and soundproof room Each of the volunteers was also fitted with microphones near their ears to record the sounds produced by the subjects and the sounds that were echoed back to them. For each run, a single volunteer held their head steady (normally they swing their heads as they walk to better hear echoes) and attempted to locate the plate, which was posted in one of four varying points in the room.

The researchers found that the subjects were best at locating the disk when it was directly in front of them—all eight volunteers found it every time. They were all pretty good at finding it when it was placed at 45 to 90-degree angles, as well. It was when the disk was placed behind them that they started having trouble. They went from an average accuracy of 80 percent with angles of 135 degrees to 50 percent when the disk was directly behind them. The researchers also found that the volunteers varied both the volume and rate of clicks they made when attempting to locate something. Perhaps most interesting was that they found that the volunteers could hear softer echoes that sound experts had indicated

were impossible for humans to hear, suggesting their brains have adapted to use a new form of sensory input.

More information: L. Thaler et al. Human echolocators adjust loudness and number of clicks for detection of reflectors at various azimuth angles, *Proceedings of the Royal Society B: Biological Sciences* (2018). DOI: 10.1098/rspb.2017.2735

Abstract

Some people can echolocate like bats, making clicks with their mouths. In this paper we show that blind echolocators dynamically adjust the loudness and numbers of mouth clicks that they make when they detect objects off to the side or behind them, as compared to objects in front of them. The findings help us understand how expert echolocators achieve their incredible skill. The findings will also be useful for teaching echolocation to other people.