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Human echolocation: Using tongue-clicks to navigate the world

By William Kremer BBC World Service

Daniel Kish has been blind since he was a baby but that hasn't stopped him living an incredibly active life that includes hiking and mountain-biking. To do this, he has perfected a form of human echolocation, using reflected sound waves to build a mental picture of his surroundings.

When Daniel Kish clicks his tongue, the world answers back.

Cars, trees, doorways, bollards on the pavement... all are identified and mapped in his brain using information gleaned from a series of sharp little taps of his tongue against the roof of his mouth, two or three times a second.

From an early age, the Californian developed a sonar technique which allowed him to navigate using echoes from repeated tongue-clicks. The skill has led to him being dubbed a "real-life Batman" - a description he welcomes.

"It is the same process bats use," he says. "You send out a sound or a call and sound waves are physical waves - they bounce back from physical surfaces."

"So if a person is clicking and they're listening to surfaces around them they do get an instantaneous sense of the positioning of these surfaces."

The echoes from his clicks inform Kish about an object's distance, size, texture and density. It's enough for him to differentiate between, say, a metal fence and a wooden fence.

"It's not that I can really tell metal from wood, but I can tell the difference between the arrangement of structures," he says.

"For example, a wooden fence is likely to have thicker structures than a metal fence and when the area is very quiet, wood tends to reflect a warmer, duller sound than metal."

But, he adds, conditions really have to be right to discern this reliably.

Echolocation has allowed Kish to pursue outdoor hobbies such as hiking, despite being totally blind. Kish also says echolocation allows him to engage aesthetically with the world.

"The sense of imagery is very rich for an experienced user. One can get a sense of beauty or starkness or whatever - from sound as well as echo," he says.

"Even architecture has some distinction. One can click at a building, for example, and hear whether or not the building is ornamented or featureless."

Is echolocation a form of seeing?

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