neurons that fire when silence begins. "When a sound suddenly stops, that's an event just as surely as when a sound starts."

Even though we usually think of silences as a lack of input, our brains are structured to recognize them, whenever they represent a sharp break from sounds. So the question is what happens after that moment— when silence continues, and the auditory cortex settles into a state of relative inactivity.

One of the researchers who's examined this question is a Duke University regenerative biologist, Imke Kirste. Like Bernardi, Kirste wasn't trying to study silence at all. In 2013, she was examining the effects of sounds in the brains of adult mice. Her experiment exposed four groups of mice to various auditory stimuli: music, baby mouse calls, white noise, and silence. She expected that baby mouse calls, as a form of communication, might prompt the development of new brain cells. Like Bernardi, she thought of silence as a control that wouldn't produce an effect.

As it turned out, even though all the sounds had short-term neurological effects, not one of them had a lasting impact. Yet to her great surprise, Kirste found that two hours of silence per day prompted cell development in the hippocampus, the brain region related to the formation of memory, involving the senses. This was deeply puzzling: The total absence of input was having a more pronounced effect than any sort of input tested.

Here's how Kirste made sense of the results. She knew that "environmental enrichment," like the introduction of toys or fellow mice, encouraged the development of neurons because they challenged the brains of mice. Perhaps the total absence of sound may have been so artificial, she reasoned—so alarming, even—that it prompted a higher level of sensitivity or alertness in the mice. Neurogenesis could be an adaptive response to uncanny quiet.

The growth of new cells in the brain doesn't always have health benefits. But in this case, Kirste says that the cells seemed to become functioning neurons. "We saw that silence is really helping the new generated cells to differentiate into neurons, and integrate into the system."

While Kirste emphasizes that her findings are preliminary, she wonders if this effect could have unexpected applications. Conditions like dementia and depression have been associated with decreasing rates of neurogenesis in the hippocampus. If a link between silence and neurogenesis could be established in humans, she says, perhaps neurologists could find a therapeutic use for silence.

While it's clear that external silence can have tangible benefits, scientists are discovering that under the hoods of our skulls "there isn't really such a thing as silence," says Robert Zatorre, an expert on the neurology of sound. "In the absence of sound, the brain often tends to produce internal representations of sound."

Imagine, for example, you're listening to Simon and Garfunkel's "The Sound of Silence," when the radio abruptly cuts out. Neurologists have found that if you know the song well, your brain's