

TRILOBITES

Silence Is a 'Sound' You Hear, Study Suggests

In auditory illusion tests, people perceive silence as a form of sound, just as Simon and Garfunkel suggested.

By Bethany Brookshire

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The hush at the end of the musical performance. The pause in a dramatic speech. The muted moment when you turn off the car. What is it that we hear when we hear nothing at all? Are we detecting silence? Or are we just hearing nothing and interpreting that absence as silence?

The “Sound of Silence” is a philosophical question that made for one of Simon & Garfunkel’s most enduring songs, but it’s also a subject that can be tested by psychologists. In a paper published Monday in the Proceedings of the National Academy of Sciences, researchers used a series of sonic illusions to show that people perceive silences much as they hear sounds. While the study offers no insight into how our brains might be processing silence, the results suggest that people perceive silence as its own type of “sound,” not just as a gap between noises.

‘The vision that was planted in my brain still remains’

Rui Zhe Goh, a graduate student in cognitive science and philosophy at Johns Hopkins University and one of the scientists involved in the study, described a koan that he likes: “Silence is the experience of time passing.” He said he interprets that to mean that silence is “an auditory experience of pure time.”

That idea made him wonder whether silence, the absence of sound, was something that we really experience, “or is silence just kind of the lack of experience?”

Chaz Firestone, a cognitive scientist at Johns Hopkins and another author of the study, said that if silence is “not really a sound, and yet it turns out that we can hear it, then evidently, hearing is about more than just sounds.”

But simply asking “Can you perceive silence?” is a difficult question. So the two researchers, with Ian Phillips, a philosopher, asked a different question: Does the mind treat silence the same way it treats sounds?

'People hearing without listening'

The researchers tested people recruited online with a series of sound illusions. The first test compared a single longer sound with two shorter sounds. The two shorter sounds together added up to the same amount of time as the longer sound. But when people listened to them, they perceived the single sound as lasting longer.

To apply that illusion to silence, Mr. Goh and colleagues inverted the test. The scientists used sounds of restaurants, busy marketplaces, trains or playgrounds, and inserted chunks of silence for participants to compare.

The researchers supposed that if people perceive silences as their own type of sound, then silences should be subject to the same illusion as the sounds. One long silence should be perceived as longer than the total of two shorter silences. But if people perceive silence as a lack of sound, the illusion might not exist.

Other tests placed silence in different contexts to produce more sonic illusions. In every case they tested, listeners perceived the illusion of a period of silence being longer just as they would have perceived an illusion of a longer sound.

"When I heard it the first time, I was like 'Wow, it works!'" Mr. Goh said. Even though he made the tests himself, and he knew the periods of silence were exactly the same length, he still experienced the illusion that one silence was longer than two.

Dr. Firestone said the illusions were just as powerful with silences as they were with sounds. "It's not even like, 'Oh, it kind of works with silences, but it's just a lot weaker,'" he said. "No, you get the same effect." In other words, people react to silences the same way they react to sounds, even though they aren't "hearing" anything at all.

'Hear my words that I might teach you'

It would be easy to reject the idea that silence has a sound, said Sami Yousif, a cognitive scientist at the University of Pennsylvania who was not involved in the study. Sounds are waves impacting the cells in your ear. Silence is not. But that doesn't mean we can't detect that silence.

The study, Dr. Yousif said, shows that "those blank spaces are also a kind of event, they are a kind of unit that is represented in our experience."

He also appreciated how the researchers used illusions tweaked for silence instead of sound. "It's very clever in the way that it uses sort of known phenomena, and applies them to silences instead," he said.

Although the researchers did not study how people's brains responded to silence, Mr. Goh suggested that existing research supported the idea that some neurons and neural processes were involved in the perception of silence.

And knowing that we do perceive silence makes silence that much, er, louder: "Silence is a real experience," Mr. Goh said. Maybe we'll all pay more attention to moments of quiet once we know we can hear the "sounds" of silence.

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