Our Brains Are Wired So We Can Better Hear Ourselves Speak, New Study Shows

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Freshman, Multicultural & Linguistic studies

Vocabularies:

- Mute button (n.)--- unspoken button
- Homogenous (adj.)--- similar, comparable
- Amplify (v.)--- increase in size or effect
- Neuroscientist (n.)--- the scientist who study neuron（神經元）
- Emit (v.)--- discharge, give off
- Epilepsy (n.)--- physical disorder of muscle spasm（癲癇）
- Mechanism (n.)--- machine, device
- Monitor (v.)--- keep track of, control
- Auditory (adj.)--- hearing
- Suppressed (adj.)--- restrained, not released
- Cortex (n.)--- protective layer in the brain（腦皮層）

Vocabularies:

- Mosaic (n.)--- a patchwork to cover things（馬賽克）
- Dynamically (adv.)--- changeably, variably
- schizophrenia (n.)--- emotional disorder（精神分裂症）
- Hallucinations (n.)--- imagination, dream
- Lobe (n.)--- a piece separated from brain
- Hemisphere (n.)--- one of two equal parts of a whole
- Seizures (n.)--- sudden attack of illness
- Lulls (v.)--- calm
- Electrode (n.)--- terminal of electricity
- Implant (v.)--- insert, root
- Vocalizations (n.)--- communication with language

Editor's Choice

Main Category: Psychology / Psychiatry

Also Included In: Neurology /Neuroscience
Hearing / Deafness

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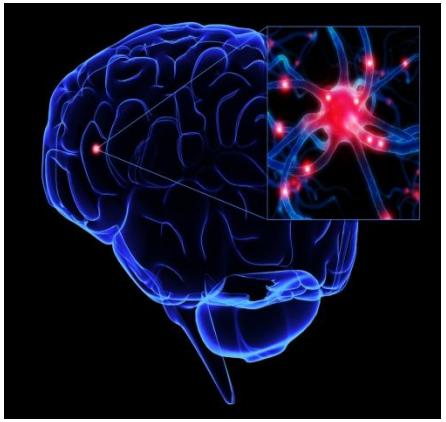
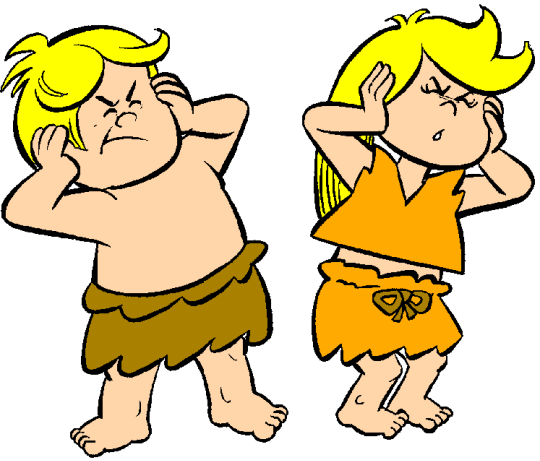
Like the mute button on the TV remote control, our brains filter out unwanted noise so we can focus on what we're listening to.

But when it comes to following our own speech, a new brain study from the University of California, Berkeley, shows that instead of one homogenous mute button, we have a network of volume settings that can selectively silence and amplify the sounds we make and hear.

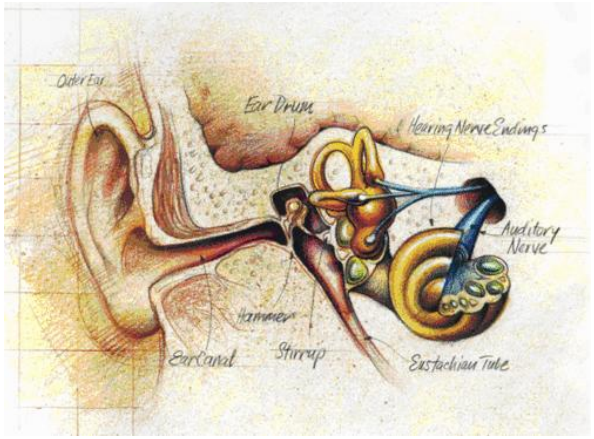
Neuroscientists from UC Berkeley, UCSF and Johns Hopkins University tracked the electrical signals emitted from the brains of hospitalized epilepsy patients.



They discovered that neurons in one part of the patients' hearing mechanism were dimmed when they talked, while neurons in other parts lit up.

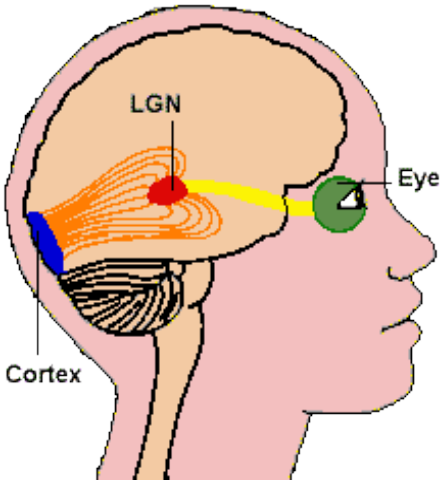


Their findings, published in the *Journal of Neuroscience*, offer new clues about how we hear ourselves above the noise of our surroundings and monitor what we say.



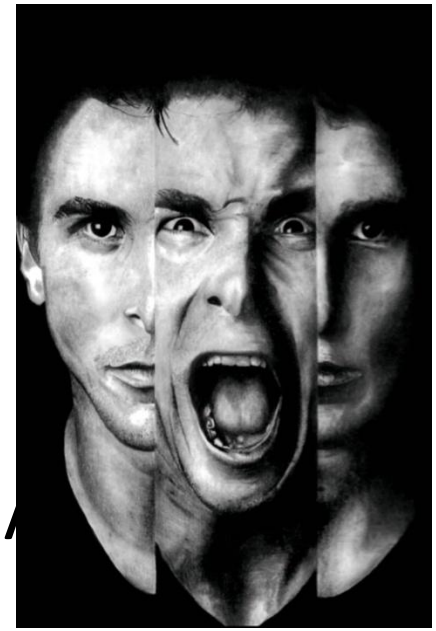
Previous studies have shown a selective auditory system in monkeys that can amplify their self-produced mating, food and danger alert calls, but until this latest study, it was not clear how the human auditory system is wired.

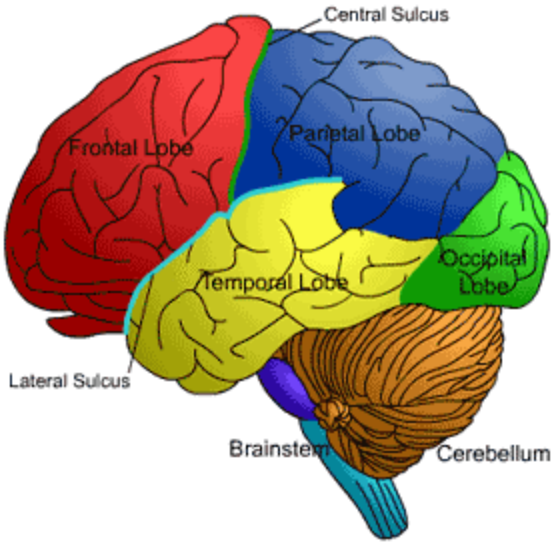
"We used to think that the human auditory system is mostly suppressed during speech, but we found closely knit patches of cortex with very different sensitivities to our own speech that paint a more complicated picture," said Adeen Flinker, a doctoral student in neuroscience at UC Berkeley and lead author of the study.



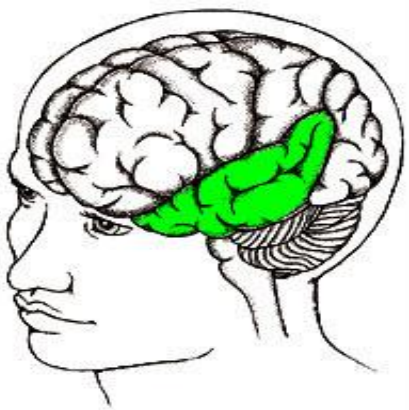
"We found evidence of millions of neurons firing together every time you hear a sound right next to millions of neurons ignoring external sounds but firing together every time you speak," Flinker added. "Such a mosaic of responses could play an important role in how we are able to distinguish our own speech from that of others." While the study doesn't specifically address why humans need to track their own speech so closely, Flinker theorizes that, among other things, tracking our own speech is important for language development, monitoring what we say and adjusting to various noise environments.

"Whether it's learning a new language or talking to friends in a noisy bar, we need to hear what we say and change our speech dynamically according to our needs and environment, " Flinker said. He noted that people with schizophrenia have trouble distinguishing their own internal voices from the voices of others, suggesting that they may lack this selective auditory mechanism. The findings may be helpful in better understanding some of auditory hallucinations, he said.



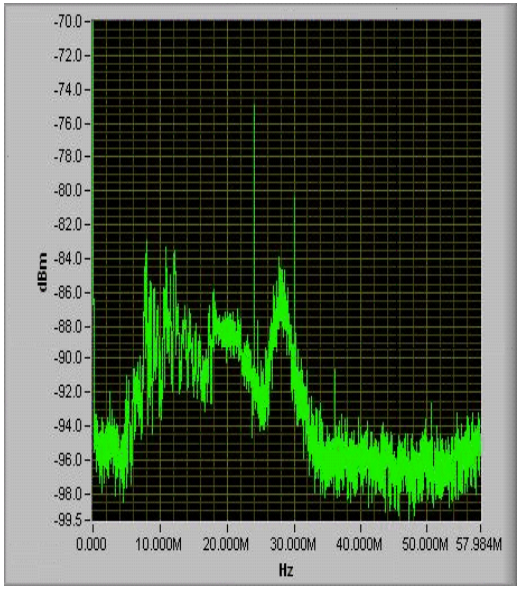


Moreover, with the finding of sub-regions of brain cells each tasked with a different volume control job - and located just a few millimeters apart– the results pave the way for a more detailed mapping of the auditory cortex to guide brain surgery.



The auditory cortex is a region of the brain's temporal lobe that deals with sound. In hearing, the human ear converts vibrations into electrical signals that are sent to relay stations in the brain's auditory cortex where they are refined and processed. Language is mostly processed in the left hemisphere of the brain.

In the study, researchers examined the electrical activity in the healthy brain tissue of patients who were being treated for seizures. The patients had volunteered to help out in the experiment during lulls in their treatment, as electrodes had already been implanted over their auditory cortices to track the focal points of their seizures.



Researchers instructed the patients to perform such tasks as repeating words and vowels they heard, and recorded the activity. In comparing the activity of electrical signals discharged during speaking and hearing, they found that some regions of the auditory cortex showed less activity during speech, while others showed the same or higher levels. "This shows that our brain has a complex sensitivity to our own speech that helps us distinguish between our vocalizations and those of others, and makes sure that what we say is actually what we meant to say," Flinker said.

In addition to Flinker, the study's authors are …

*  Robert Knight
director of the Helen Wills Neuroscience Institute at UC Berkeley

-  Neurosurgeon Edward Chang (UCSF)
-  Neurosurgeon Nicholas Barbaro (UCSF)
-  Neurologist Heidi Kirsch (UCSF)
-  Neurologist Nathan Crone
at Johns Hopkins University in Maryland.

Source:
University of California - Berkeley

http://www.medicalnewstoday.com/articles/211056.php

Thanks for paying your attention! ☺

My opinions toward this article:

It’s always a delightful thing to know more about ourselves; no matter it’s heath knowledge or the essence of life. As a human being, there is never the end for tracking mysteries of creatures.