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Humans with Amazing Senses

Scientists have discovered that in the brains of the blind, the visual cortex has not become useless, as they once believed. When blind people use another sense -- touch or hearing, for example -- to substitute for sight, the brain's visual cortex becomes active, even though no images reach it from the optic nerve. Echolocation creates its own images.

"I can hear that wall behind you over there. I can hear right there -- the radio, and the fan," Ben says.

Ben says every object in his life talks to him in ways that no one else can hear or understand.

Forty-year-old Daniel Kish of Long Beach, Calif., also uses echolocation, and has become an expert on it, founding the World Access for the Blind, an organization that teaches others how to echolocate. Kish leads other blind people on mountain biking tours and hikes in the wilderness, visualizing and describing the picturesque sights around him through echolocating.

Clicking to Do Anything

If you listen closely to Ben or Kish, you can hear how they find their way. Ben says he can distinguish where the curbs are as he cruises his neighborhood streets.

He can find the pole and the

backboard on a basketball goal, and tell which is which by the distinctive echo each makes. Even though he can't see the goal he's aiming for, he can sink a basket. Ben doesn't remember how or when he began clicking, but he's developed his abilities to such an extent that aside from echolocation, he can rapidly discriminate the sounds in video games.

Ben lost his sight when he was 2. He was diagnosed with cancer in both eyes, and when chemotherapy failed, his mother, Aquanetta Gordon, was left with one option: For her son to live, both his eyes had to be surgically removed.

Gordon remembers her son after the operation.

"He woke up and he said, 'Mom, I can't see anymore, I can't see anymore.' And I took his hands and I put them on my face and I said, 'Baby, yes, you can see.' I said, 'You can see with your hands.' And then I put my hand on his nose and I said, 'You smell me? You can see with your nose and your ears. ... You can't use your eyes anymore, but you have your hands and your nose and your ears.'"

In a house already filled with three other children, Ben's mother decided not to treat his blindness as a handicap. In school, Ben recognizes his classmates by their voices. With the help of Braille

books and a talking laptop computer, Ben attends the same classes as sighted students.

Rich Mental Images, Without Visual Elements

Like Ben, Kish also lost his eyesight to cancer at age 2. He was raised to believe he could do pretty much anything, and he discovered clicking by accident as a child.

"I have mental images that are very rich, very complex. They simply do not possess the visual element," Kish says.

In retrieving those pictures, Kish varies the pace and volume of his clicks as he walks along; and what he can tell you about an object's qualities is sometimes astonishingly thorough.

If bats can distinguish prey as small as mosquitoes with echolocation, and some dolphins can detect small targets a hundred yards away, what are the ultimate capabilities of human beings like Ben and Kish?

Peter Scheifele, who studies hearing and sound production in animals and people at the University of Connecticut, analyzed samples of the clicks that Ben and Kish make.

"Ben clicks, looks to me like once every half second, whereas a dolphin is actually making 900

clicks per second. And the bat is even faster than that," Scheifele says.

The bottom line: Human beings send out sounds at much slower rates and lower frequencies, so the objects people can picture with echolocation must be much larger than the ones bats and dolphins can find.



Imagine if every sound you heard reverberated right through your brain.

Adrian McLeish could hear a voice in his head. Not just any voice — his own, amplified and distorted, echoing through his skull. But it didn't stop there. Adrian heard every sound in his body. His heart beating in his chest was, at times, deafening. The sound of his own chewing was maddening.

It all began in 1985. British-born McLeish was 35 years old, living in Kassel, Germany and playing French horn in the orchestra there. One day, as he was practicing his horn, he noticed that something felt different.

"I had this strange sensation that I was hearing my horn playing somehow through the inside of my head," McLeish, now 58, said. "The same was true of my voice."

McLeish described the reverberations of his voice as sounding like a cracked loudspeaker or "like somebody humming through a kazoo." In the beginning, they were irritating and constant, but not debilitating.

The Sound Of His Eyes

At first, McLeish, paid little attention to the change, figuring it would eventually just go away. But it didn't. Every day, over a period of

months, the sensations grew more intense and more disruptive. He could hear his own footsteps and the sound of his own chewing as he ate. The vibrations of passing cars and trains were nearly intolerable. Even playing his beloved horn became excruciating.

What stopped him in his tracks was the evening he thought he heard a mouse rustling about in the walls. Putting down his book, he rose from bed to inspect for rodents but each time he stopped to listen, the noises stopped as well.

Finally he realized the disturbing truth: There was no mouse. McLeish was hearing the sounds of his own eyes, as they moved back and forth across the pages of his book.

"It was extremely weird," McLeish said. "And unsettling."

McLeish also developed a high-pitched whistling in his ear, a condition known as tinnitus.

But the trouble didn't stop there. Several months after his hearing problems began, McLeish began to be plagued by a new set of symptoms: involuntary eye movements caused by sound.

"I was talking to somebody on the phone," McLeish said. "And when the phone rang on the other end, I noticed that the bookshelves on the other room tipped five degrees in

the opposite way."

Any loud noise would cause McLeish's eyes to jerk and throw his balance off. And things only got worse.

"I started to notice that as I spoke, my eyes were jerking with my speech," he said. "If I played a series of notes on the horn, my eyes would jump up and down."

Doctor to McLeish: Drink More Beer

He began to seek out a diagnosis, visiting countless doctors, all seemingly puzzled by his symptoms. One doctor attributed the condition to stress and prescribed tranquilizers. Another told him to drink more beer.

He even consulted a faith healer, who told him that a colleague had placed a demon in his head in order to sabotage his horn playing.

Eventually, McLeish underwent three surgeries, but his condition was once again misdiagnosed and the operations failed. McLeish was beginning to lose hope. He was dealt another blow last year, when the noise finally drove him to stop playing his horn.

"It's difficult when your husband has something like this," his wife Cindy said. "It's difficult to know that he's suffering."

One evening McLeish sat down at his computer and Googled his symptoms. To his shock, the simple Internet search turned up a rare condition that matched his symptoms perfectly: Superior Canal Dehiscence or SCD.

Even more amazing, he learned that Dr. Lloyd Minor, the surgeon at Johns Hopkins Medical Center who originally discovered and described SCD in 1995, had also devised a surgical treatment for it. McLeish immediately made plans to have surgery on his left ear. During June of last year McLeish travelled to Baltimore.

The Cure

The human ear contains three canals filled with fluid. When we move, the fluid in the canals moves with us and signals the eyes to shift subtly. This helps us to maintain our balance, stand upright, and walk and run without falling over.

"They're like a gyroscope in an airplane and every time we move our head, even by a minute amount, these receptors tell our brain how the head is moving," Minor explained.

Superior Canal Dehiscence is a defect in the inner ear caused by the thinning of the bone that separates the superior canal from the brain. In the case of McLeish,

the fluid in his ear, separated by only a thin membrane, touched his brain and transmitted all the sounds from his body right to his head.

When McLeish arrived in Baltimore, he endured a battery of tests to confirm the diagnosis, including a CT scan and an exam where copper wired contact lenses were placed on his eyes.

Once Minor and his colleague, Dr. John Carey, were certain that McLeish did in fact have SCD, they scheduled him for the microsurgery that might answer his prayers.

The day before the surgery, the medical team affixed electrodes to McLeish's face, creating a virtual map of his skull that would guide the surgeons through the operation. Once in the operating room, the doctors plugged the hole in McLeish's ear with tissue and bone taken from his skull.

In the post-operative ICU, McLeish's wife waited anxiously for her husband to stir from his anesthesia-induced sleep.

'I Got My Miracle'

When his eyes finally fluttered open, the first words out of his mouth were, "Will I be able to play the piano?" It was the punch line to the couple's favorite medical joke.

McLeish's recovery was surprisingly

smooth.

"I said when I came here, if they gave me 50 percent reduction in my symptoms, it would have been good," he said, a week after his surgery. "I said 90 percent would be a miracle. I got 98 percent. It's better than I ever hoped. I got my miracle."

Eight months after he laid down his horn, and only four months after the operation, McLeish was able to return to his orchestra in Germany. When he finished his first concert in more than a year, he knew for sure that life had finally returned to normal.

"The noises are gone," he said. "It took me 23 years to find out what I had. In the future I hope that people can find it much sooner and get the relief I've gotten."

For more information about Superior Canal Dehiscence please visit the [Vestibular Disorders Association](#) and the [Johns Hopkins Web site](#).

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One Woman's Struggle to Live in a World With Music

By LAURA VIDDY DARGA · March 5, 2008

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At first, Stacey Gayle thought she was losing her mind. Just the thought that music could cause a medical disaster seemed ridiculous ... after all, five years ago, Gayle was a normal college student. But that was before.

"Before, life was great actually. I had a good job. I was going to church, I was going to school," Gayle said. "I had big dreams."

But then, her life was put on hold. One night while asleep, she passed

out.

"All I remember is waking up in the hospital and ... the nurse was standing over me and telling me that I had a seizure and I didn't even know what a seizure was at that time, so I was a little bit frightened."

null

After two years and many more seizures, she finally got a diagnosis: epilepsy. Like nearly three million other Americans, Gayle had an abnormal pattern of electrical activity in her brain.

Medication didn't help much, and worse yet, Gayle and her doctors had no idea what was triggering her intense seizures, or how rare a case she really was, until one day in the summer of 2006.

She was at a barbecue and remembers hearing a hot new hip-hop song called "Temperature," by Caribbean singer Sean Paul.

"My friend and I were just standing there — all I remember is the song came on. And I just remember like falling out and having a big seizure," Gayle said. "I realized that every time it came on, I was there having seizures. I could — as soon as the first beat came on, I'd just go into a seizure, I'm not certain why."

Was it possible that her seizures really be triggered by a song?

"I definitely thought I was crazy," she said.

One in 10 Million

It sounded strange, but Gayle's doctors at the [Comprehensive Epilepsy Center](#) had actually heard of such a thing.

As bizarre as it sounded, Gayle's suspicion was finally confirmed when doctors admitted her to the Long Island Jewish Medical Center for a series of tests.

After hooking her up to a brain imaging machine, they waited.

"She didn't have any seizures for three, four days ... so we figured, oh boy, well, we'll have to just bring her back another day," said Dr. Ashesh Mehta, LIJ's director of epilepsy surgery at the center.

Gayle suggested that she come in with her iPod to "make" herself have seizures.

"She played it all night long," Dr. Mehta said. "And she had three seizures that night."

Her doctors suspected she was suffering from "musicogenic" epilepsy.

"I had heard of musicogenic epilepsy. I'd certainly read about it," said Dr. Mehta. "So I knew that this could happen. Of course, given how

rare it is ... the prevalence ... was something like one in 10 million, by some estimates."

In fact, there have only been 100 cases documented, and Gayle is now one of them.

Seeking Solace From Music

It is known that epilepsy can be triggered by strong scents or flashing lights. When Prince Charles and Camilla appeared together for the first time, television stations were asked to slow down the footage because the intensity of flashbulbs could cause seizures.

But triggers have been known to take bizarre forms.

In the 1990s, a woman reported having seizures triggered by the voice of "Entertainment Tonight" host Mary Hart.

For Gayle, the mystery of her epileptic trigger was now resolved. But her situation became even more dire. Soon music of almost any kind was causing her seizures ... sometimes up to 10 times a day.

"It's something really hard to live with," Gayle said. "I remember ... coming down the stairs and someone outside was playing that music loud in a car and I remember falling down the stairs, and that's it."

Unable to walk down the street, go

shopping, eat in a restaurant, ride the subway, drive a car or do anything where she might hear a song playing, 24-year-old Gayle had no choice: she quit school, her job, and stopped going to church and singing in her beloved choir.

Gayle was a prisoner in her own home. Even her TV became a danger.

"She could be watching like a movie and if it has music and she doesn't realize it's coming on, she would pass out," said Gayle's mom, Marhlan Nelson.

Unusual Treatment

Gayle began to become depressed, and considered suicide.

"Everything that I love was taken away," she said. "Everywhere there's music going on."

In the midst of the dark moments came a new danger. Doctors told Gayle that if they couldn't find a way to control her seizures, she could suddenly have a heart attack.

"When people have seizures over and over again, and you can't get them under control, there's a risk of, of dying from the epilepsy," Dr. Mehta said.

An unusual case of epilepsy, Dr. Mehta decided, required an unusual treatment: brain surgery. If they

could take out the part of the brain where the seizures were originating, Gayle might be seizure-free.

"What we found is, there was a little island of activity, shown in light blue, where there was in fact a little more increased activity," said Dr. Mehta, pointing to an image of Gayle's brain. "And that leads us to think that that's where the focus was."

The doctors also found another area where they thought the seizures were coming from – that was the part they needed to remove.

It was a risky surgery. Stacey would only be the fourth known patient to undergo the operation. Doctors would remove about a half dollar sized chunk of Gayle's brain. Frightened, at first Gayle and her mom said they didn't want to do it. But after looking at her now empty life, both decided it was a risk she had to take.

Road to Recovery

Today, five months later, Gayle said she hasn't had any seizures. "Every day — every day living seizure-free is like another day, is a cure for me," she said.

For the first time in five years, Gayle could listen to music, without seizures. She was nervous the first

time she played music to test and see if the surgery had worked.

"I decided that I really had to do it. So yes, I didn't have a seizure, so I was so happy.

Now Gayle feels good when she enters a store, lobby or an elevator and hears music.

"I go in the store and smile and they just be thinking I'm crazy," Gayle said. "It feels good to be back, back in school, back in church ... you know, get my life back on track finally."

Click [HERE](#) to visit the Epilepsy Foundation Web site, and learn more about the disease.



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