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San Francisco Chronicle

Noting the perfect pitch Rare musical ability to distinguish sounds by ear could be genetic

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Monday, January 14, 2002

Almost from the time he could walk, Berkeley concert pianist Roy Bogas felt the pull of music -- and an uncanny facility for recognizing, and eventually naming, notes.



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Bogas, who performs for the San Francisco Ballet and other orchestras, can instantly tell whether a given tone is an A or a D or a G or any interval between.

Known as "perfect" or "absolute" pitch, it's a rare ability in adults, even among professional musicians, who typically have what's known as "relative pitch," or the ability to tell what a note is only when given a starting note as a reference.

Now, Bogas and other walking tuning forks are the focus of intense scientific interest as researchers hunt for the roots of this remarkable skill.

A team led by geneticists Jane Gitschier at the University of California at San Francisco and Nelson Freimer at the University of California at Los Angeles has begun a study to find the gene or genes that may contribute to absolute pitch abilities.

The team is hoping to recruit large numbers of people for its study and has just developed an online test for absolute pitch that prospective subjects can take. (It is available on the Web at perfectpitch.ucsf.edu.)

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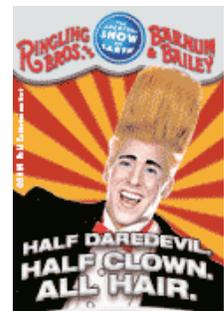
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absolute pitch clustered in families.

"What we are asking is whether or not this ability has a genetic aspect to it, and if it does, can we figure out what that gene is," Gitschier said.

SUBTLE ROLE OF GENES

Based on the evidence so far, most scientists believe that genes do play at least a subtle role, perhaps by keeping a developmental "window" open wider and longer during early childhood, when note-naming ability generally takes shape.

"We have interviewed and tested lots of people for this trait and found there is a familial aspect," Gitschier said. "There is also an environmental aspect -- if you don't have early musical training, you're probably not going to develop absolute pitch."

The goal of the current study is to clarify how genetic predisposition might dovetail with life experience to produce what Bogas calls "a higher degree of sound memory" than most people can even fathom.

Some earlier studies suggest that people lacking certain, as-yet- unidentified sound-processing circuitry in the brain may never achieve a sense of absolute pitch no matter how early their musical training starts.

One study of people with absolute pitch found 43 percent of siblings also had the ability to instantly name notes. In a separate study, investigators found the trait in only 3 percent of those whose music studies began before age 6.

Still, some experts argue the quest for an absolute pitch gene is akin to searching for a gene for speaking French; it doesn't exist.

"I'm open-minded, but skeptical," said Daniel Levitin, a cognitive neuroscientist at McGill University in Montreal who has been researching issues of sound perception in the brain. "I really don't understand what they think those genes might be coding for."

Speaking French also runs in families, he noted, but clearly the reason for that has little to do with any special genetic factors. Some people may be born predisposed for language or music skills. But, Levitin said, the genetic differences are likely to be extraordinarily subtle and difficult to isolate.

Nor is it clear why humanity needed to develop such a heightened sensitivity to pitch. It may be a byproduct of

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a more general ability to discriminate sounds. But there could not have been much survival advantage, Levitin said, for any of our prehistoric ancestors born with some innate ability to distinguish, say, an F and an A.

Despite these arguments, genes do play some role.

THE ROLE OF GENES

One particularly remarkable clue comes from studies of people with a genetic condition known as Williams syndrome. The condition is marked by profound impairments -- the inability to tie one's shoes, for example, or perform elementary arithmetic -- but often comes with a notable talent for music.

A recent study by Howard Lenhoff, an emeritus professor of microbiology at the University of California at Irvine who began studying brain science after his daughter was diagnosed with Williams syndrome, found evidence that absolute pitch may be much more prevalent among those with the condition than it is in the general population.

His daughter is one example. Lenhoff said she also has the ability to sing in foreign languages with a seemingly perfect accent and has an uncanny ability to remember tunes and lyrics.

The most persuasive theory so far seems to be that a "critical period" exists for the brain to develop an "ear," so to speak, for music and sound perception. Once attention starts to focus on other skills, the critical period closes.

People with Williams syndrome, however, seem to be able to pick up music at nearly any age, Lenhoff said.

"The normal mechanism of closing that developmental window somehow gets jammed when other cognitive functions get jammed," he said. "That window seems to stay open for longer periods in Williams syndrome, probably into adulthood."

As with language acquisition, some people just seem to have an innate skill for distinguishing sounds, and are drawn to music training as a result, while others have trouble humming even the simplest tune.

Musical families are common, as Bogas can attest: His 21-year-old daughter, Sharon, is a gifted cellist, finishing this year a course of study at the Cleveland Institute of Music. His brother, Ed Bogas, is a composer of popular music. He, too, has absolute pitch.

NATURE OR NURTURE DEBATE

Is that because of genes, or simply the influence of music-loving parents on a growing child? It seems an open question in the case of Ed and Roy Bogas. Neither of their parents was a professional musician, but they greatly appreciated music and tried to encourage their children to develop their skills.

"Both my brother and I were around music constantly as little kids," recalled Ed Bogas. "Our parents were very excited about the idea that their children might become professional musicians."

In Roy's case, however, it seemed to take very little prompting.

Family legend has it that he would sit as a toddler beside his father, a hunt-and-peck piano player, and direct Dad's fingers to the right keys. By age 5, he was taking advanced lessons. Within a year or so, he had memorized an entire Mozart concerto, which he played in recital upstairs at Carnegie Hall.

The performance amazed his parents and helped launch what turned out to be a distinguished career. But Bogas, who just celebrated his 68th birthday, recalls barely breaking a sweat.

"It came very naturally to me," he said. "I was extremely drawn to playing the piano."

Those who have absolute pitch often seem to take it for granted, saying it requires no more effort to distinguish an E from a G than it does to tell red from blue. Many insist that note-naming is a skill anybody can learn, despite the possibility that some people actually might be born "tone deaf."

"Get a pitch pipe or tuning fork and just carry it around for a couple weeks," said Ed Bogas. "Keep hitting the same tone and eventually you will be able to predict it."

He makes it sound easy. But for some of us, it may take a little more than two weeks to learn.

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