of information technology in a variety of fields, from medicine to transportation. At MOST, he built up a loyal following among scientists. "He is a man of action and principle who [has] an easygoing style," says Sun Chenbei, a former MOST staffer who is now China representative for a Canadian consulting company.

Zhu, a polymer chemist, has been named vice chair of the Education, Science, Culture, and Health Committee in the national legislature. **–DING YIMIN**

Ding Yimin writes for *China Features* in Beijing.

BEHAVIORAL GENETICS

Study Suggests Pitch Perception Is Inherited

Can't carry a tune? Chances are you can lay a lot of the blame for that on your genes, according to a report on page 1969. By studying twins' ability to perceive sour notes in familiar tunes, a U.S.–British team has concluded that the perception of relative pitch is highly heritable and is dependent on higher brain functions. And that, say geneticist Dennis Drayna of the National Institute on Deafness and Other Communication Disorders and colleagues, means that pitch perception may offer a window into brain processes that are also used in language.

The researchers administered a test, called the Distorted Tunes Test (DTT), to 284 pairs of female twins, about half of them identical and ranging in age from 18 to 74, from the St. Thomas' U.K. Adult Twin Registry. The DTT plays short snatches of 26 familiar melodies, from "Turkey in the Straw" to "Silent Night," most of them with one or more notes altered. Subjects indicate whether the tune sounds right. The distortions in the DTT are all obvious, with no pitch altered by less than a halftone. Some tunes are drastically altered (see sample from "America the Beautiful"). So anyone who gets more than three wrong is judged to be somewhat tune-deaf.

Because the identical twins' responses correlated far better than those of the fraternal twins—0.67 versus 0.44—Drayna's team believes that the trait is strongly influenced by genes. Indeed, the team estimated the heritability for tune deafness at 0.80. That's about as high as it ever gets for genetically complex traits, rivaling features such as height. "These results demonstrate for the first time the powerful influence of genes on the ability of humans to recognize correct pitch and melodies," says co-author Tim Spector, who heads the twin research unit at St. Thomas' Hospital in London.

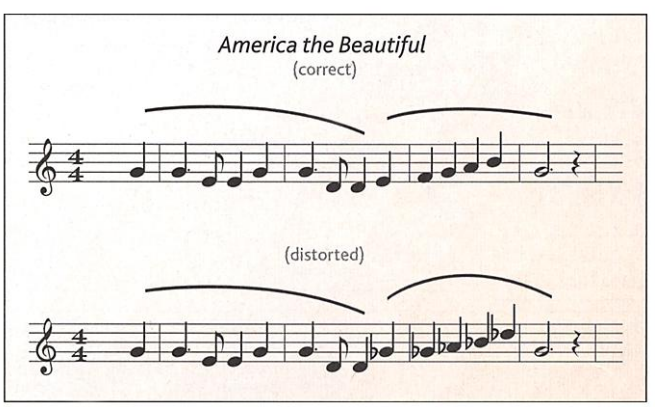
Brain researchers are fascinated by pitch perception, because it taps into cognitive functions, Drayna says. A person can do well on an audiological test and still flunk the DTT—and vice versa—showing that the "musical pitch perception is largely independent of peripheral hearing," the researchers conclude. And although absolute pitch (the ability to recognize an isolated note) is to some degree trainable, scores on tests of relative pitch perception "don't change appreciably over an individual's lifetime," says Drayna—a finding suggesting that, as with language, there's hard wiring involved.

Evan Balaban of The Neurosciences Institute in San Diego agrees that the study is an "important" one that "is looking at something very likely to be a central [brain] function." The study clearly demonstrates a biological basis for pitch discrimination, Balaban says. But he's reluctant to buy the heritability estimate, in part because twins are somewhat more prone than nontwins to developmental disabilities. As evidence, he points out that almost 40% of the twins showed some evidence of deficits in pitch recognition compared with 27% in the control population. The authors argue that their twins are no different from the general population, in which 5% have severe deficits in pitch recognition. They say cultural unfamiliarity with some of the tunes might have lowered the scores a bit.

Scientists hope the study of pitch will provide a lever for studying communication disorders. "The pitch contour of the voice communicates a lot of information about emotions, [so] to tell the difference between different pitch contours would use some of the same abilities" as are used in talking, notes Balaban. Severe defects in pitch perception therefore "could be a subtle indicator" of imperfections in wiring in language-related cortical areas. Drayna agrees, citing as "tantalizing evidence" anecdotal reports of severe tune deafness in people with certain speech and language disorders, such as a problem with processing spoken words known as "cluttering."

Other researchers are also in hot pursuit of brain clues offered by pitch perception. In a paper published in the January issue of *Developmental Psychology*, psychologist Jenny R. Saffran of the University of Wisconsin, Madison, reported that 8-month-old infants, "like many songbirds," may come equipped with absolute pitch—further evidence of the importance of pitch recognition for language learning, she says. Saffran speculates that this knack, which is rare in adults but can be enhanced by early training, is superseded by relative pitch perception as the brain develops. And that talent, which is both more useful and more cerebrally sophisticated, now appears to be primarily determined by the genes.

–CONSTANCE HOLDEN



Tin ears. About 5% of the population wouldn't have a clue which is the right version.

AIDS VACCINES

Long-Lasting Immunity Conferred in Monkeys

Faced with the lack of a critical reagent, Harriet Robinson of Emory University in Atlanta was forced to redesign an AIDS vaccine experiment. From that minor setback has emerged an impressive finding about the lasting power of her vaccine approach.

In a paper published online today by *Science* (www.sciencexpress.org), Robinson, Emory colleague Rama Rao Amara, the paper's first author, and others describe a two-step AIDS vaccine strategy they developed in collaboration with Bernard Moss of the National Institute of Allergy and Infectious Diseases (NIAID). In a large monkey experiment, this vaccine appears to have stimulated long-lasting immunity. "It's among the most exciting concepts that we've seen in this [monkey] model," says Peggy Johnston, head of NIAID's AIDS vaccine program.

Robinson, Amara, Moss, and co-workers built their experiment around a laboratory-made, hybrid virus called SHIV, which is part HIV and part SIV, a simian AIDS virus. They first injected 24 monkeys with a vaccine that contained several SHIV genes stitched into a circular piece of bacterial DNA. Following vaccination with this relatively easy-to-make "naked DNA," the researchers gave the animals a booster shot consisting of a variety pack of SHIV genes carried by recombinant modified vaccinia Ankara (MVA), a version of the virus used as the smallpox vaccine. Rather than raising antibodies that can derail the AIDS virus before it causes an infection, both the naked DNA and MVA vaccines primarily stimulate the immune system to target and eliminate already infected cells.